

FCC Part 15E Measurement and Test Report

For

CreatComm Technology Co.,Ltd

Fourth floor, Building F1, R&D III Areas, Xu Zhuang Software Park, No.699

Xuanwu Avenue, Nanjing, Jiangsu province, China

FCC ID: 2AHYN-N100

FCC Rule(s): FCC Part 15.407

Product Description: Wireless CPE

Tested Model: CForce N100

Report No.: WTX19X05031406W-1

Sample Receipt Date: 2019-05-20

Tested Date: 2019-05-20 to 2019-06-20

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM Test Technology Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: CreatComm Technology Co.,Ltd
Address of applicant: Fourth floor, Building F1, R&D III Areas, Xu Zhuang Software Park, No.699 Xuanwu Avenue, Nanjing, Jiangsu province, China

Manufacturer: CreatComm Technology Co.,Ltd
Address of manufacturer: Fourth floor, Building F1, R&D III Areas, Xu Zhuang Software Park, No.699 Xuanwu Avenue, Nanjing, Jiangsu province, China

General Description of EUT	
Product Name:	Wireless CPE
Brand Name:	/
Model No.:	CForce N100
Adding Model(s):	/
Rated Voltage:	DC24V
Battery Capacity:	/
Power Adapter:	/
<i>Note: The test data is gathered from a production sample, provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Support Standards:	802.11a, 802.11n(HT20) , 802.11n-HT40
Frequency Range:	5250-5350MHz, 5470-5725MHz,
RF Output Power:	18.02dBm (Conducted)
Type of Modulation:	BPSK, QPSK, 16QAM, 64QAM,
Data Rate:	6-54Mbps, up to 300Mbps
Quantity of Channels:	15
Type of Antenna:	PCB Antenna
Antenna Gain:	Antenna1:10dBi Antenna2:10dBi

1.2 Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.407: General technical requirements.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

KDB789033 D02 v02r01: GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, KDB789033 D02 v02r01. The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

1.4 Table for parameters of Test Software setting

Enter “artgui.exe” into the calculator to enter the engineer mode, you can start to test. During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Antenna1

Mode	Test Frequency (MHz)												
	NCB: 20MHz												
	5180	5200	5240	5260	5300	5320	5500	5580	5700	5720	5745	5785	5825
802.11a 6Mbps	-	-	-	13.5	13.5	13.5	13.5	13.5	13.5	-	-	-	-
802.11n-HT20 MCS0	-	-	-	8.5	8.5	7.5	8	8	8	-	-	-	-
Mode	NCB: 40MHz												
	5190	5230	5270	5310	5510	5550	5670	5710	5755	5795			
802.11n-HT40 MCS0	-	-	11	11	10.5	10.5	10.5	-	-	-			

Antenna1

Mode	Test Frequency (MHz)												
	NCB: 20MHz												
	5180	5200	5240	5260	5300	5320	5500	5580	5700	5720	5745	5785	5825
802.11a 6Mbps	-	-	-	13.5	13.5	13.5	13.5	13.5	13.5	-	-	-	-
802.11n-HT20 MCS0	-	-	-	9	9	9	7.5	7.5	7.5	-	-	-	-
Mode	NCB: 40MHz												
	5190	5230	5270	5310	5510	5550	5670	5710	5755	5795			
802.11n-HT40 MCS0	-	-	11	11	11	11	11	-	-	-			

1.5 EUT Operating during test

EUT was programmed to be in continuously transmitting mode. During the test, EUT operation to normal function and programs under Android were executed.

1.6 Test Facility

FCC – Registration No.: 125990

Shenzhen SEM Test Technology Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration Of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

1.7 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, with a duty cycle equal to 100%, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11a	5260MHz,5280MHz,5320MHz,5500MHz,5600MHz,5700MHz,
TM2	802.11n-HT20	5260MHz,5280MHz,5320MHz,5500MHz,5600MHz,5700MHz
TM3	802.11n-HT40	5270MHz,5310MHz,5510MHz,5590MHz,5670MHz

Test Conditions	
Temperature:	22~25 °C
Relative Humidity:	50~55 %.
ATM Pressure:	1019 mbar

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

1.8 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	$\pm 0.42\text{dB}$
Occupied Bandwidth	Conducted	$\pm 1.5\%$
Power Spectral Density	Conducted	$\pm 1.8\text{dB}$
Conducted Spurious Emission	Conducted	$\pm 2.17\text{dB}$
Conducted Emissions	Conducted	9-150kHz $\pm 3.74\text{dB}$
		0.15-30MHz $\pm 3.34\text{dB}$
Transmitter Spurious Emissions	Radiated	30-200MHz $\pm 4.52\text{dB}$
		0.2-1GHz $\pm 5.56\text{dB}$
		1-6GHz $\pm 3.84\text{dB}$
		6-18GHz $\pm 3.92\text{dB}$

1.9 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due Date
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2019-04-30	2020-04-29
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2019-04-30	2020-04-29
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2019-04-30	2020-04-29
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2019-04-30	2020-04-29
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2019-04-30	2020-04-29
SEMT-1011	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2019-05-05	2021-05-04
SEMT-1042	Horn Antenna	ETS	3117	00086197	2019-05-05	2021-05-04
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2019-05-05	2021-05-04
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2019-05-05	2021-05-04
SEMT-1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2019-04-30	2020-04-29
SEMT-1003	L.I.S.N	Schwarz beck	NSLK8126	8126-224	2019-04-30	2020-04-29
SEMT-1002	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2019-04-30	2020-04-29
SEMT-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2019-04-30	2020-04-29
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2019-04-30	2020-04-29
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2019-04-30	2020-04-29
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2019-05-05	2021-05-04
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2019-04-30	2020-04-29
SEMT-1048	RF Limiter	ATTEN	AT-BSF-2400~2500	/	2019-04-30	2020-04-29
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2019-04-30	2020-04-29
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	2019-03-18	2020-03-17
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	2019-03-18	2020-03-17
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	2019-03-18	2020-03-17
SEMT-C004	Cable	Zheng DI	2M0RFC	/	2019-03-18	2020-03-17
SEMT-C005	Cable	Zheng DI	1M0RFC	/	2019-03-18	2020-03-17
SEMT-C006	Cable	Zheng DI	1M0RFC	/	2019-03-18	2020-03-17

Software List			
Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission)*	CCS	EZ-EMC	V1.0
EMI Test Software (Conducted Emission)*	CCS	EZ-EMC	V1.0

*Remark: indicates software version used in the compliance certification testing

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§15.203; §15.405	Antenna Requirement	Compliant
§15.207; §15.407(b)(6)	Conducted Emission	Compliant
§15.407(a)(1),(2)	Power Spectral Density	Compliant
§15.407(e)	Emission Bandwidth and Occupied Bandwidth	Compliant
§15.407(a)(1),(2)	Maximum Conducted Output Power	Compliant
§15.407(b)(1),(2),(3),(4)	Undesirable emission	Compliant
§15.205; §15.407(b)(1),(2),(3)	Radiated Emission	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.407(h)	Dynamic Frequency Selection (DFS)	Compliant

N/A: not applicable

3. RF Exposure

3.1 Standard Applicable

According to §1.1307 and §2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the MPE Report.

4. Antenna Requirement

4.1 Standard Applicable

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

4.2 Evaluation Information

This product has a PCB antenna, fulfill the requirement of this section.

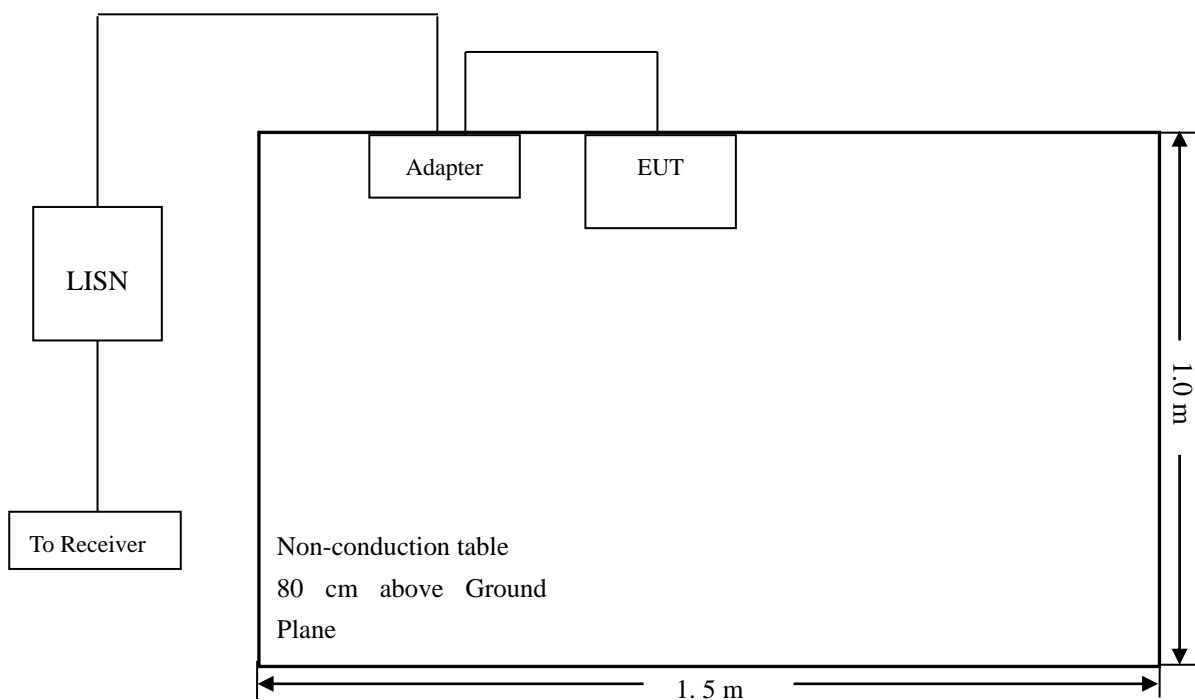
5. Conducted Emissions

5.1 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.

5.2 Basic Test Setup Block Diagram



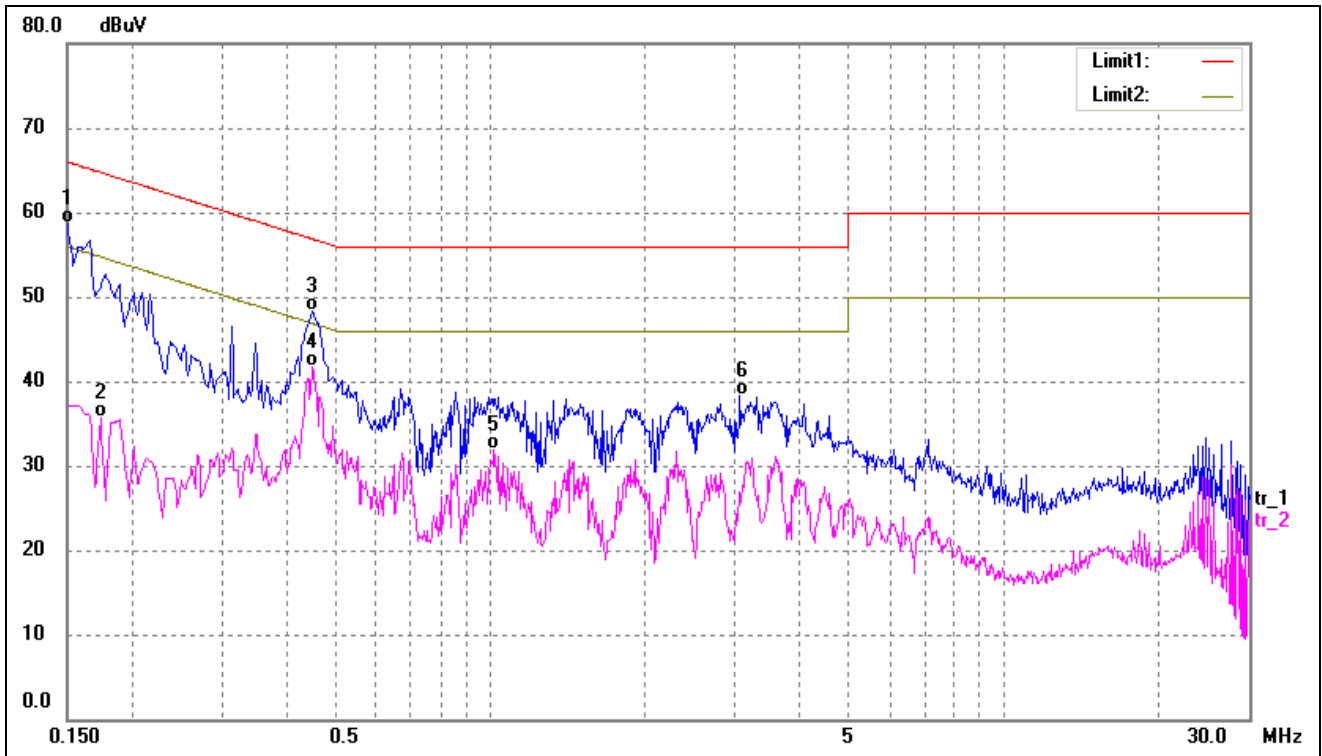
5.3 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency	150 kHz
Stop Frequency	30 MHz
Sweep Speed	Auto
IF Bandwidth.....	10 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode	Normal

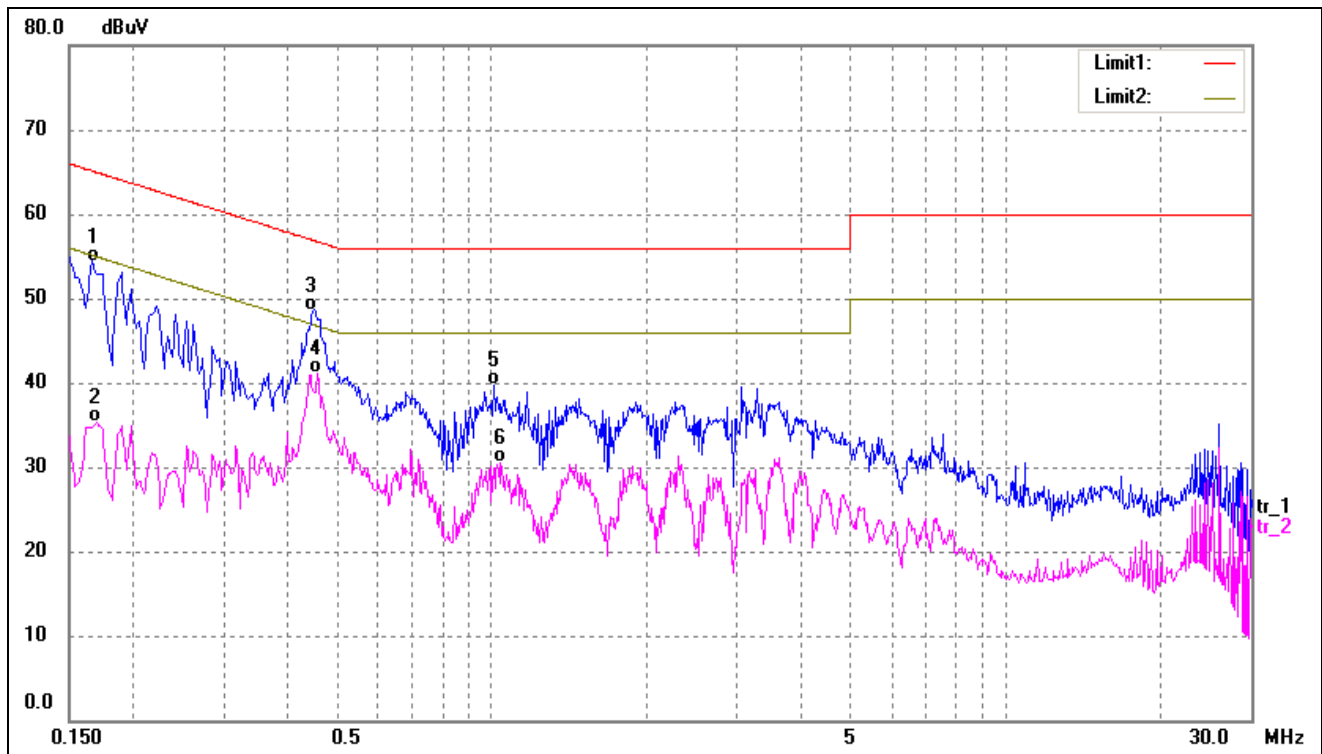
5.4 Summary of Test Results/Plots

Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral
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No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1500	48.62	10.10	58.72	66.00	-7.28	QP
2	0.1740	25.56	10.11	35.67	54.77	-19.10	AVG
3	0.4500	38.00	10.27	48.27	56.88	-8.61	QP
4*	0.4500	31.52	10.27	41.79	46.88	-5.09	AVG
5	1.0180	21.50	10.50	32.00	46.00	-14.00	AVG
6	3.0660	27.60	10.68	38.28	56.00	-17.72	QP

Test Mode	Communication	AC120V 60Hz	Polarity:	Line
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No.	Frequency	Reading	Correct	Result	Limit	Margin	Detector
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.1660	44.29	10.11	54.40	65.16	-10.76	QP
2	0.1700	25.12	10.11	35.23	54.96	-19.73	AVG
3	0.4500	38.33	10.27	48.60	56.88	-8.28	QP
4*	0.4580	30.74	10.27	41.01	46.73	-5.72	AVG
5	1.0060	29.29	10.50	39.79	56.00	-16.21	QP
6	1.0420	20.00	10.51	30.51	46.00	-15.49	AVG

6. Power Spectral Density

6.1 Standard Applicable

Section 15.407(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

6.2 Test Procedure

According to 789033 D02 v02r01 General UNII Test Procedures New Rules v02, the following is the measurement procedure.

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth ($< 1 \text{ MHz}$, or $< 500 \text{ kHz}$) and integrated over 1 MHz, or 500kHz bandwidth, the following adjustments to the procedures apply:

- a) Set $RBW \geq 1/T$, where T is defined in section II.B.1.a).
- b) Set $VBW \geq 3 RBW$.
- c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10\log(500\text{kHz}/RBW)$ to the measured result, whereas $RBW (< 500 \text{ kHz})$ is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
- d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add $10\log(1\text{MHz}/RBW)$ to the measured result, whereas $RBW (< 1 \text{ MHz})$ is the reduced resolution bandwidth of spectrum analyzer set during measurement.
- e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the sections 5.c) and 5.d) above, since $RBW=100 \text{ kHz}$ is available on nearly all spectrum analyzers.

6.3 Summary of Test Results/Plots

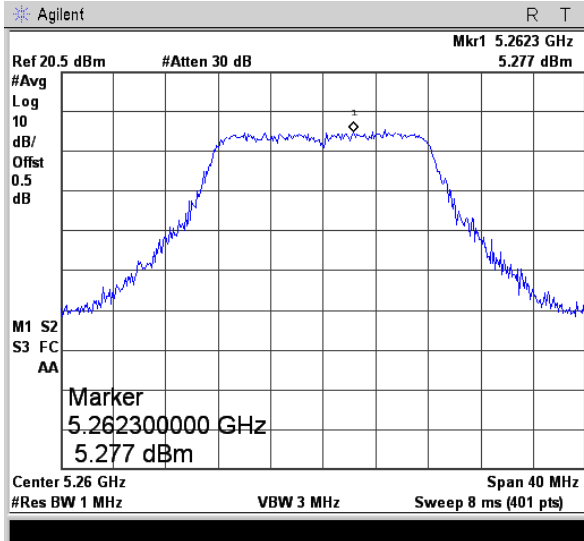
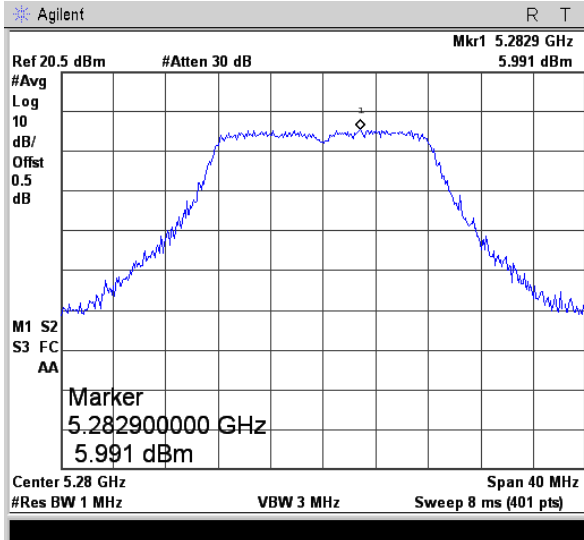
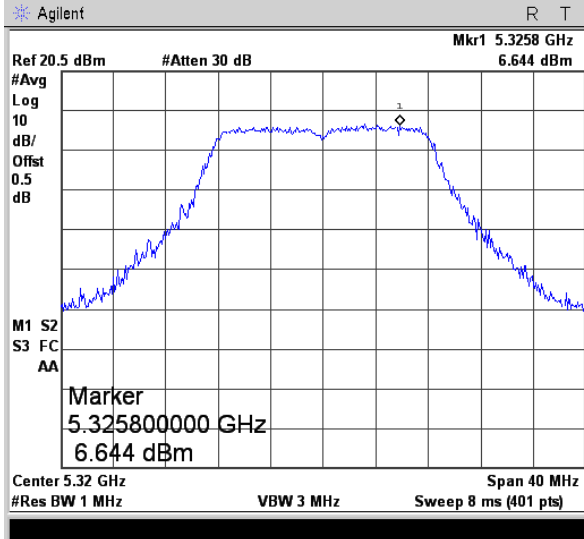
U-NII-2A: 5250-5350MHz					
Operating mode	Test Channel	Power Spectral Density dBm/MHz		Total dBm/MHz	Limit (dBm/MHz)
		ANT1	ANT2		
802.11a	5260	5.28	5.81	/	7
	5280	5.99	5.90	/	7
	5320	6.64	5.36	/	7
802.11n-HT20	5260	0.19	0.03	3.12	4
	5280	0.28	0.23	3.27	4
	5320	0.09	0.20	3.16	4
802.11n-HT40	5270	0.40	-0.08	3.18	4
	5310	0.77	0.26	3.53	4

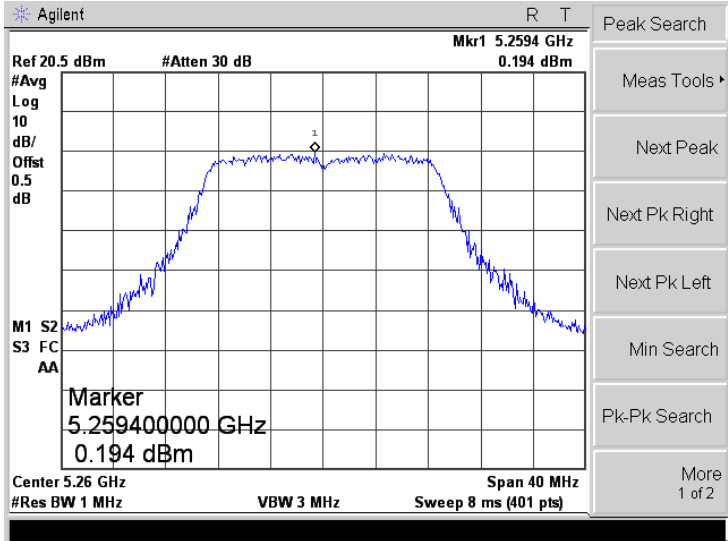
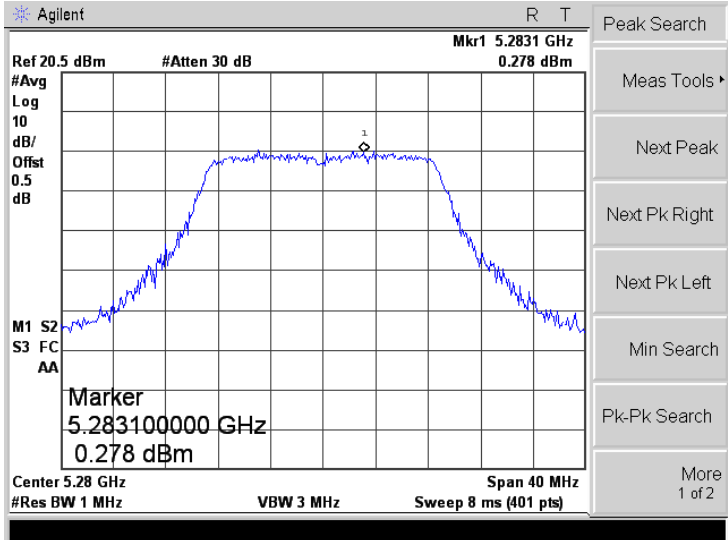
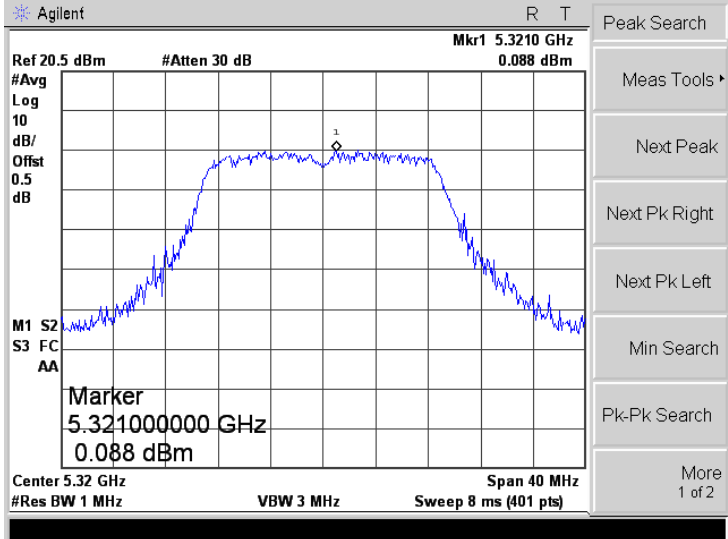
U-NII-2C: 5470-5725MHz					
Operating mode	Test Channel	Power Spectral Density dBm/MHz		Total dBm/MHz	Limit (dBm/MHz)
		ANT1	ANT2		
802.11a	5500	6.56	6.07	/	7
	5600	6.29	5.81	/	7
	5700	5.93	6.64	/	7
802.11n-HT20	5500	0.43	0.42	3.44	4
	5600	0.86	0.05	3.48	4
	5700	0.90	0.68	3.80	4
802.11n-HT40	5510	0.84	0.34	3.61	4
	5590	0.34	0.58	3.47	4
	5670	0.53	0.82	3.69	4

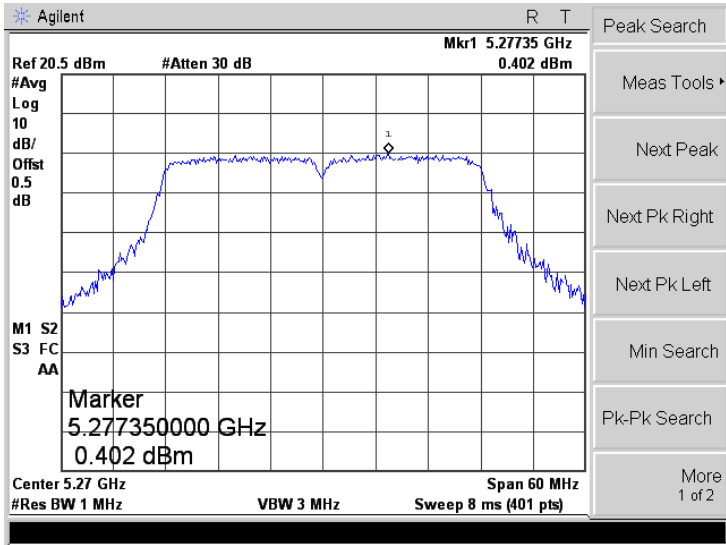
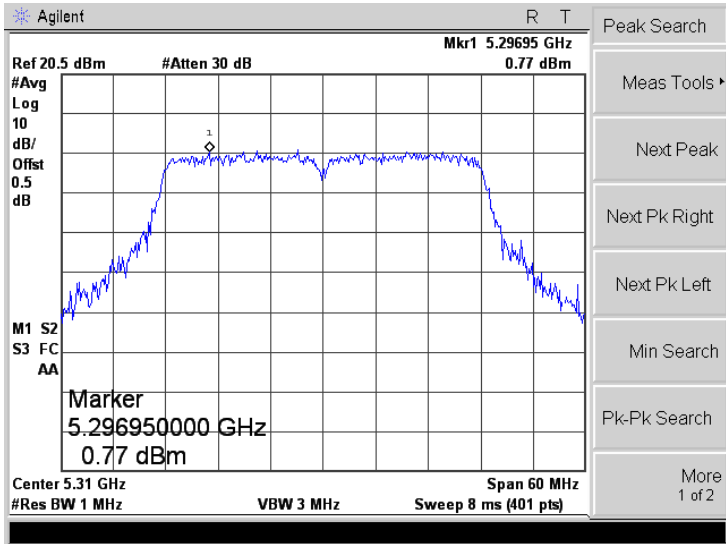
*SISO: For 5250-5350MHz, 5470-5725MHz: Limit=11-(10-6)=7dBm/MHz

MIMO: For 5250-5350MHz, 5470-5725MHz: Limit=11-(13-6)=4dBm/MHz

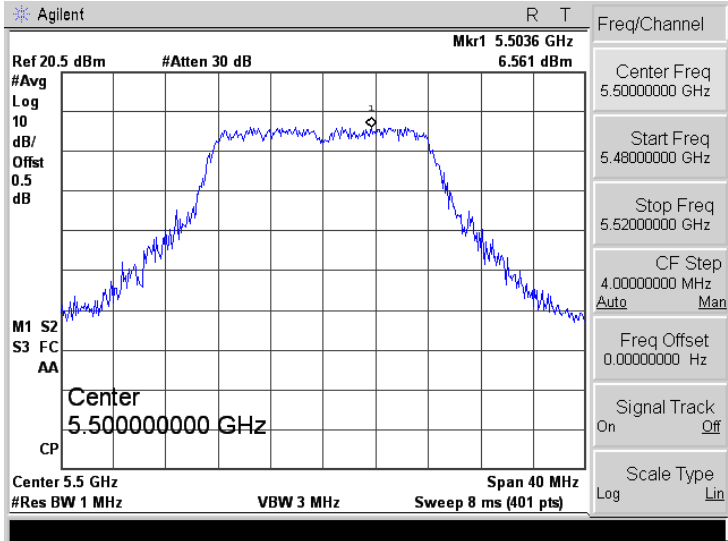
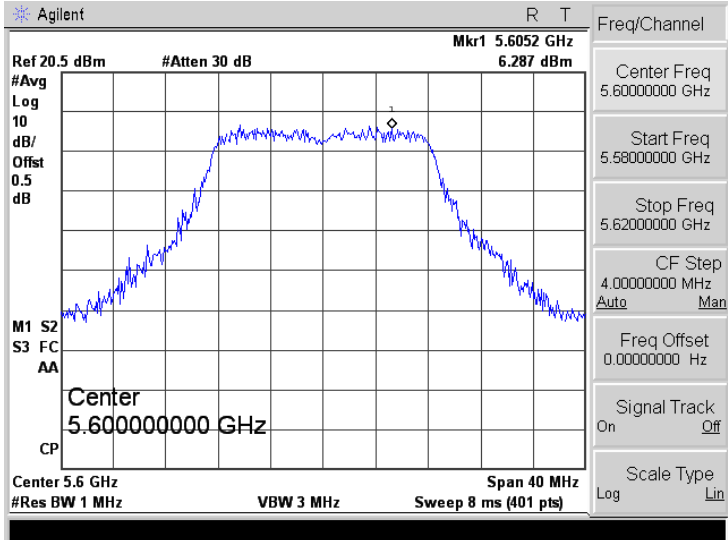
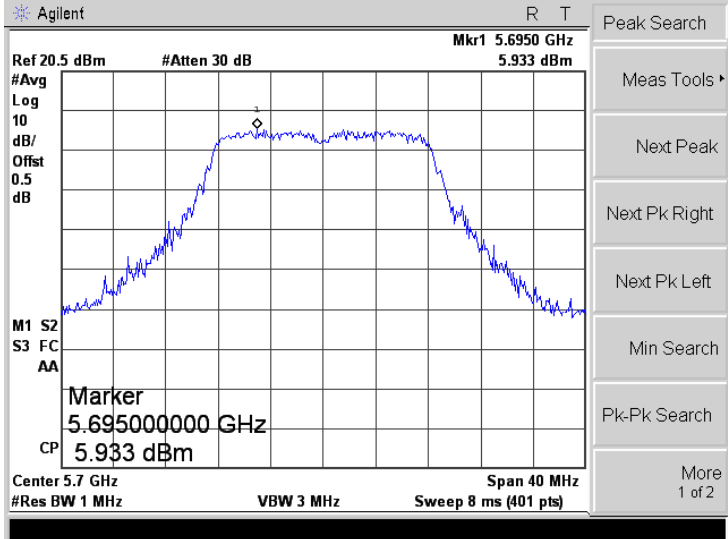
➤ Antenna 1: 5250-5350MHz

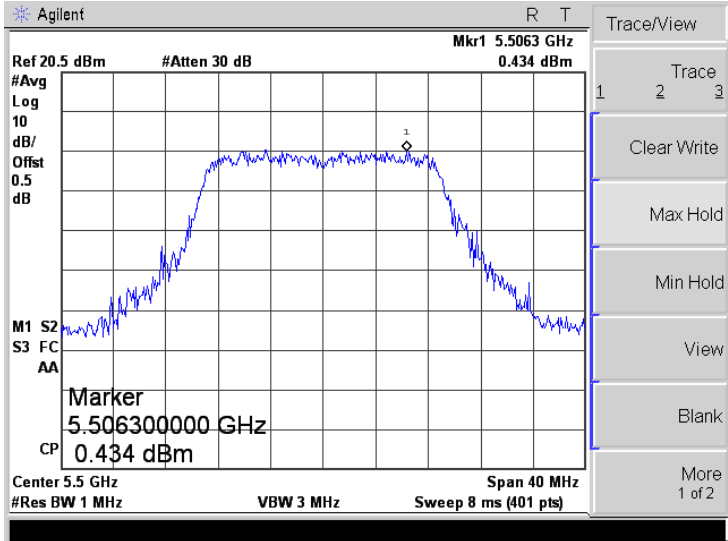
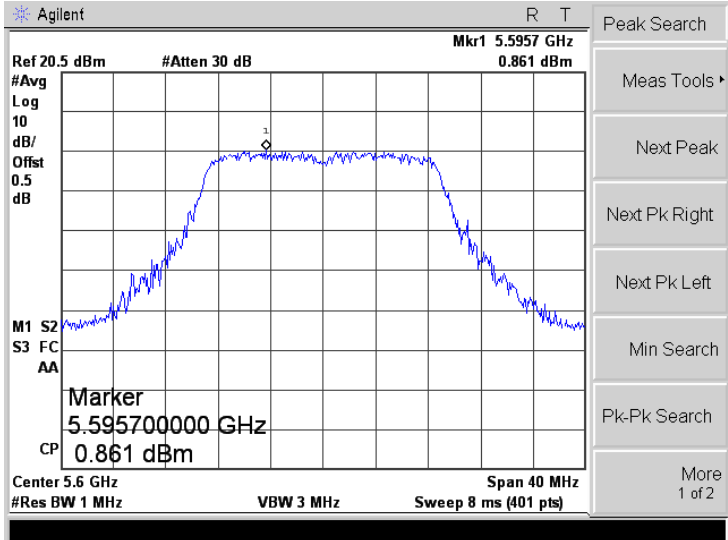
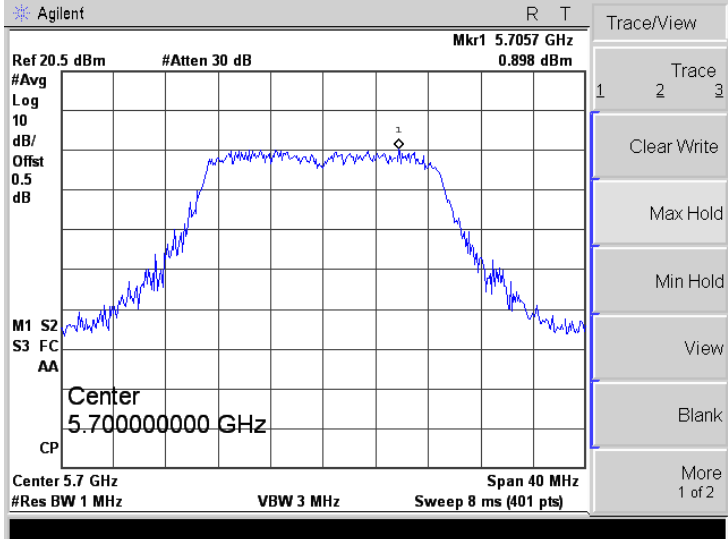
Mode:	802.11a
5260MHz	
5280MHz	
5320MHz	

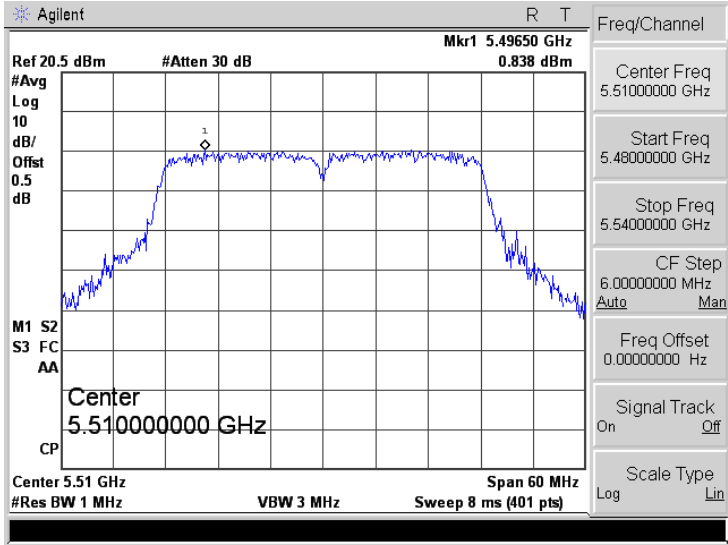
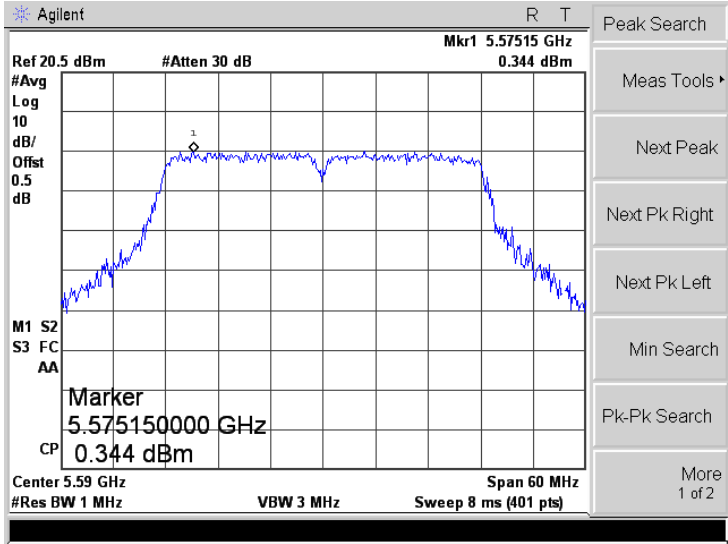
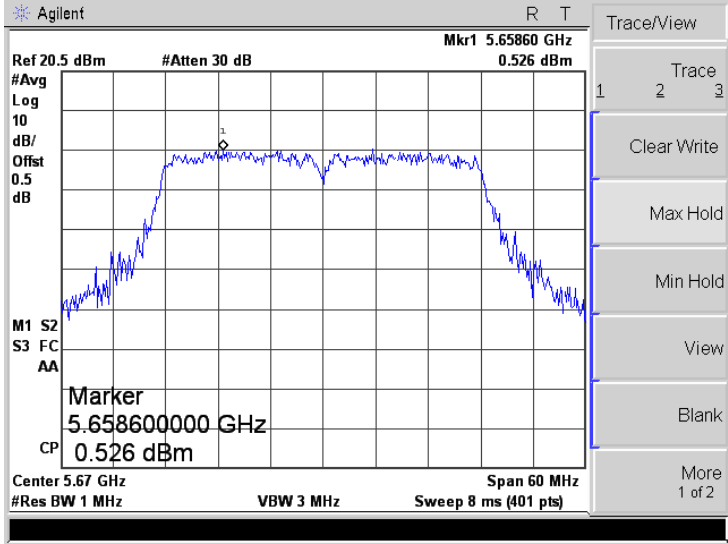
Mode:	802.11n-HT20
5260MHz	
5280MHz	
5320MHz	

Mode:	802.11n-HT40
5270MHz	
5310MHz	

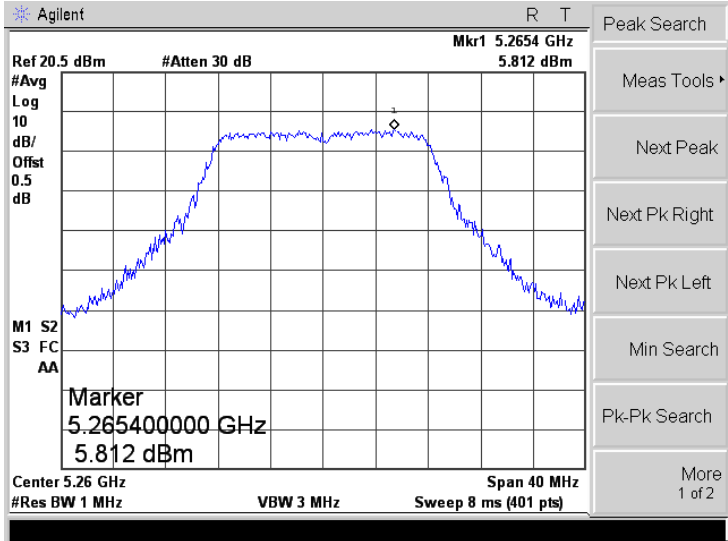
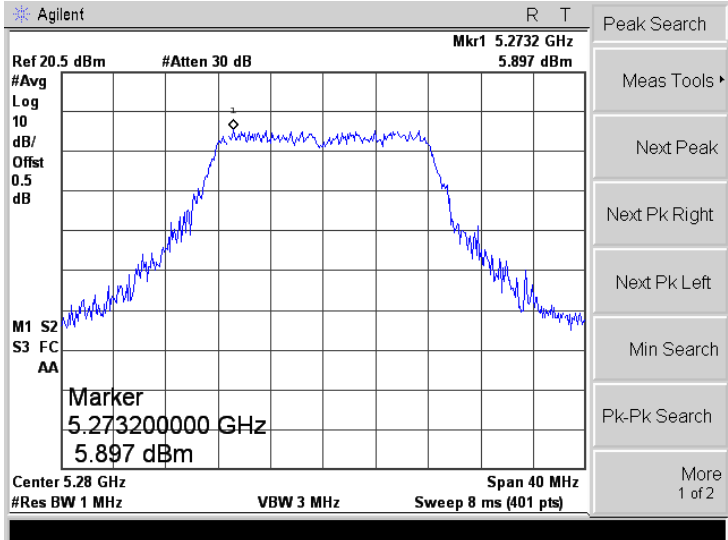
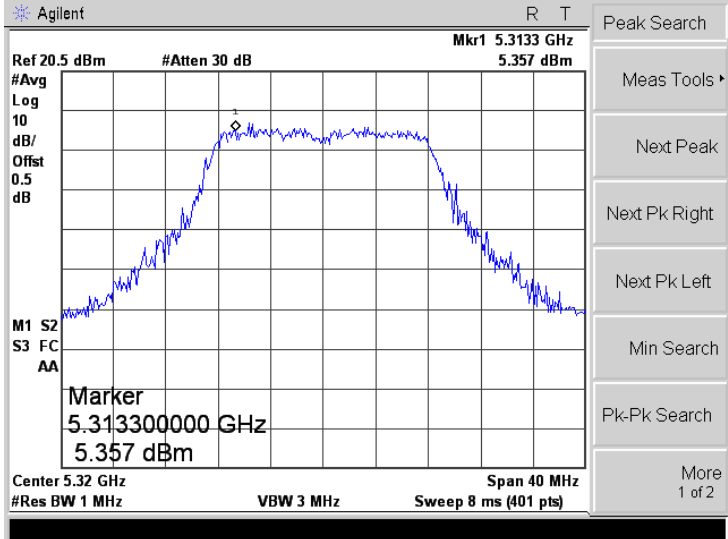
➤ Antenna 1: 5470-5725MHz

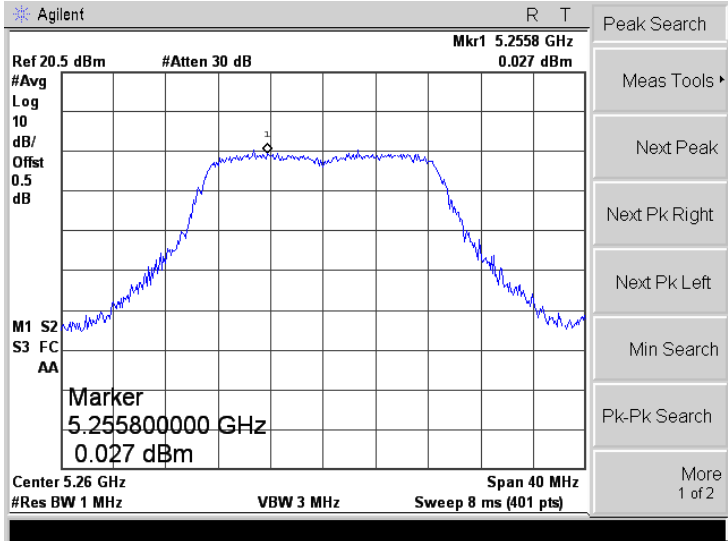
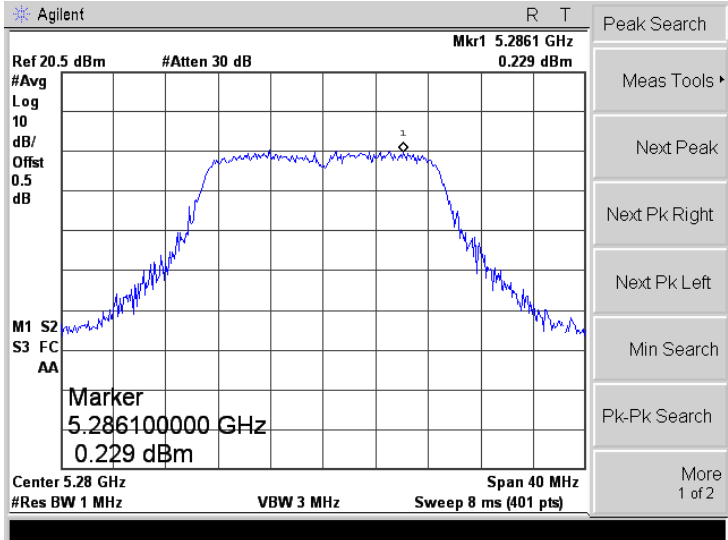
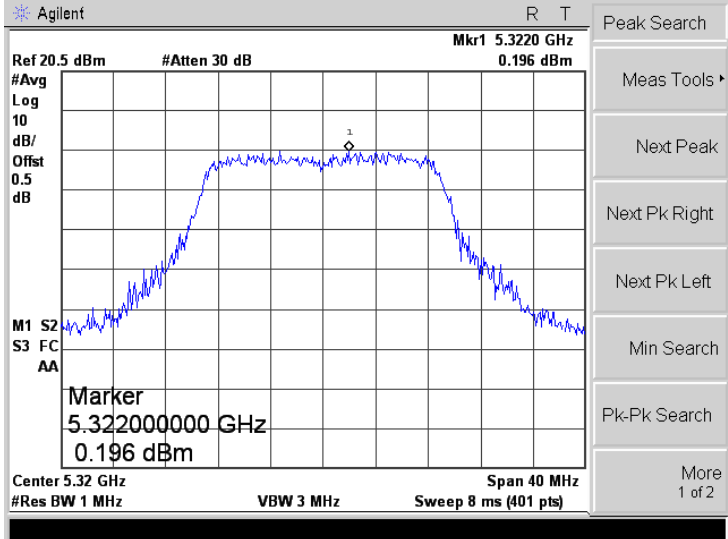
Mode:	802.11a
5500MHz	
5600MHz	
5700MHz	

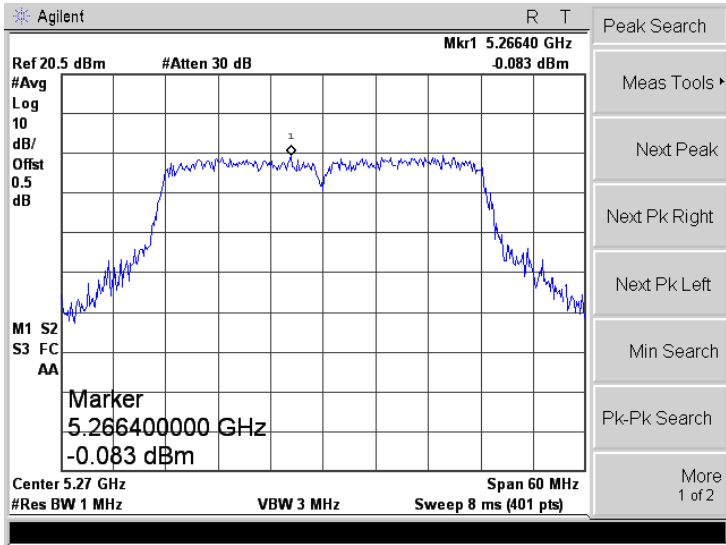
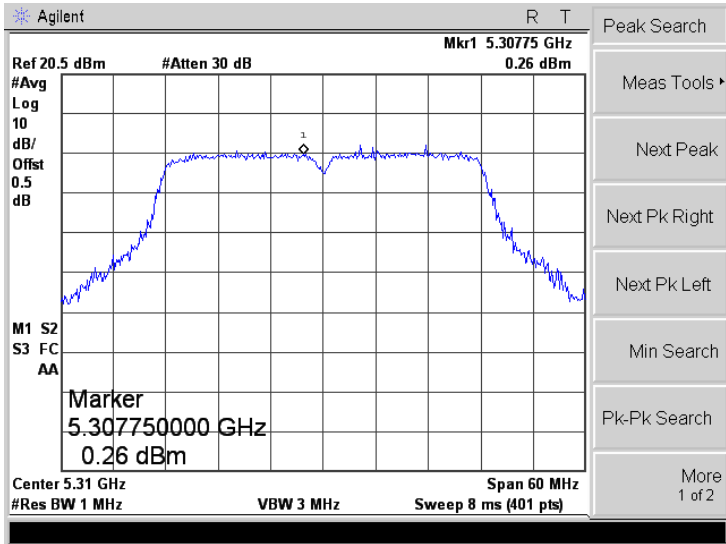
Mode:	802.11n-HT20
5500MHz	
5600MHz	
5700MHz	

Mode:	802.11n-HT40
5510MHz	
5590MHz	
5670MHz	

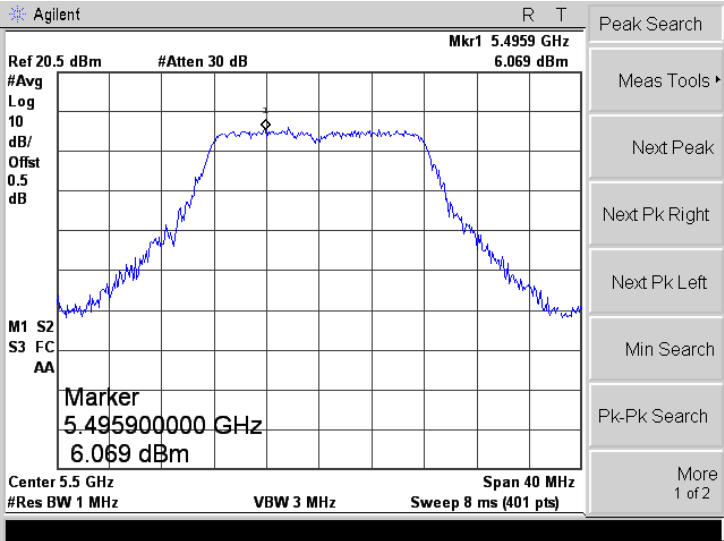
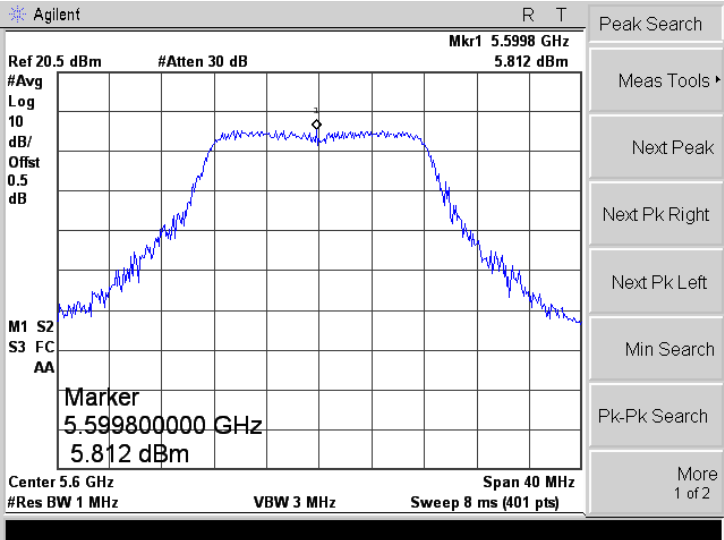
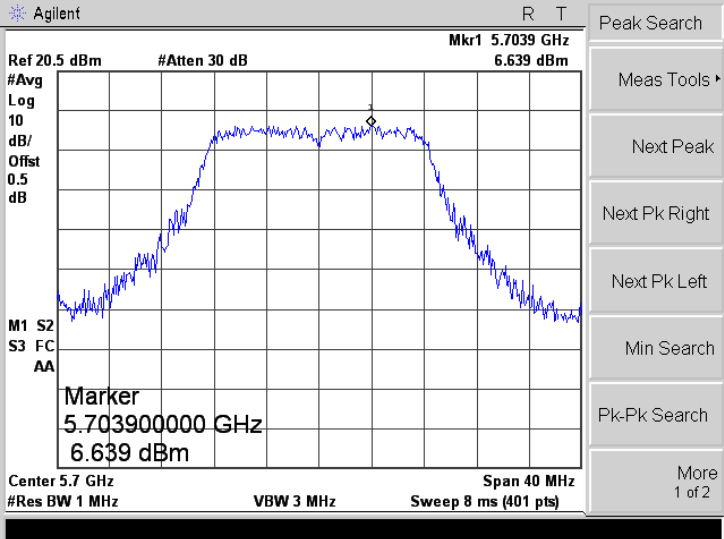
➤ Antenna 2: 5250-5350MHz

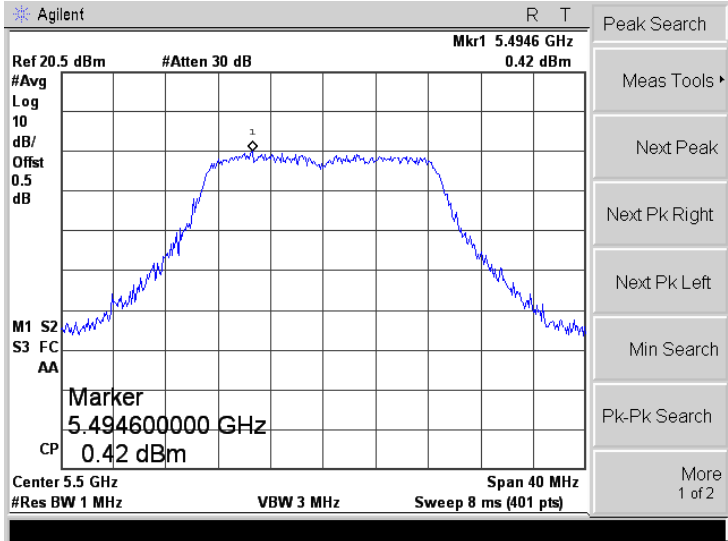
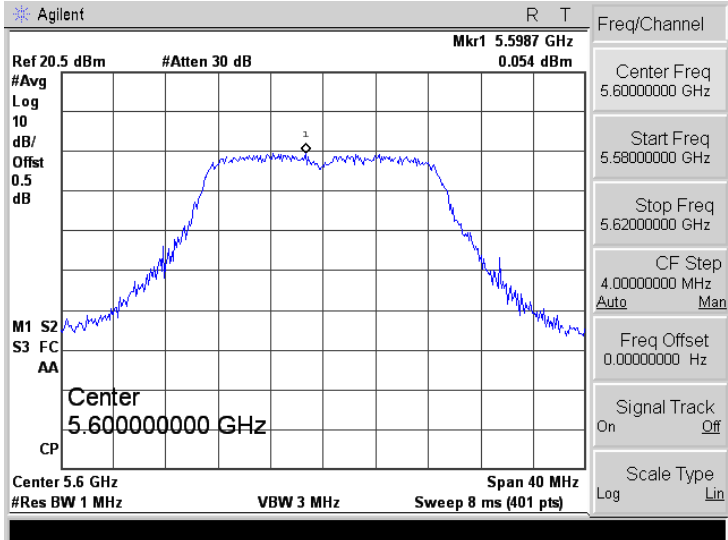
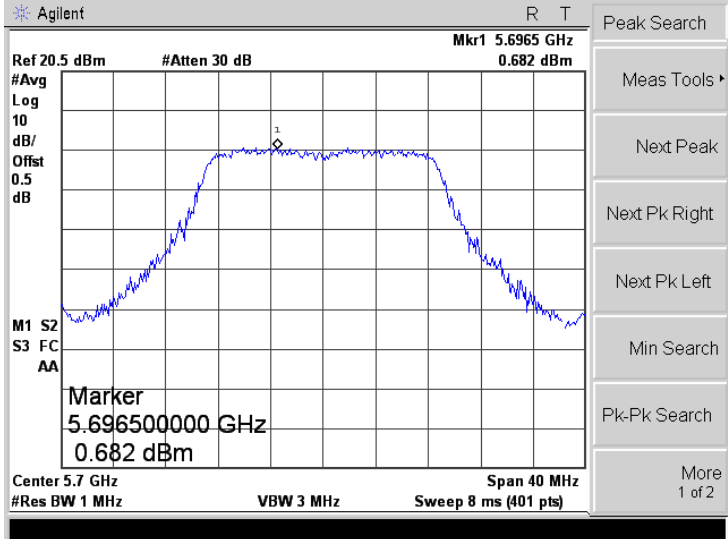
Mode:	802.11a
5260MHz	 <p>Agilent R T</p> <p>Ref 20.5 dBm #Atten 30 dB Mkr1 5.2654 GHz 5.812 dBm</p> <p>#Avg Log 10 dB/ Offst 0.5 dB</p> <p>M1 S2 S3 FC AA</p> <p>Marker 5.265400000 GHz 5.812 dBm</p> <p>Center 5.26 GHz #Res BW 1 MHz Span 40 MHz VBW 3 MHz Sweep 8 ms (401 pts)</p> <p>Peak Search Meas Tools Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2</p>
5280MHz	 <p>Agilent R T</p> <p>Ref 20.5 dBm #Atten 30 dB Mkr1 5.2732 GHz 5.897 dBm</p> <p>#Avg Log 10 dB/ Offst 0.5 dB</p> <p>M1 S2 S3 FC AA</p> <p>Marker 5.273200000 GHz 5.897 dBm</p> <p>Center 5.28 GHz #Res BW 1 MHz Span 40 MHz VBW 3 MHz Sweep 8 ms (401 pts)</p> <p>Peak Search Meas Tools Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2</p>
5320MHz	 <p>Agilent R T</p> <p>Ref 20.5 dBm #Atten 30 dB Mkr1 5.3133 GHz 5.357 dBm</p> <p>#Avg Log 10 dB/ Offst 0.5 dB</p> <p>M1 S2 S3 FC AA</p> <p>Marker 5.313300000 GHz 5.357 dBm</p> <p>Center 5.32 GHz #Res BW 1 MHz Span 40 MHz VBW 3 MHz Sweep 8 ms (401 pts)</p> <p>Peak Search Meas Tools Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2</p>

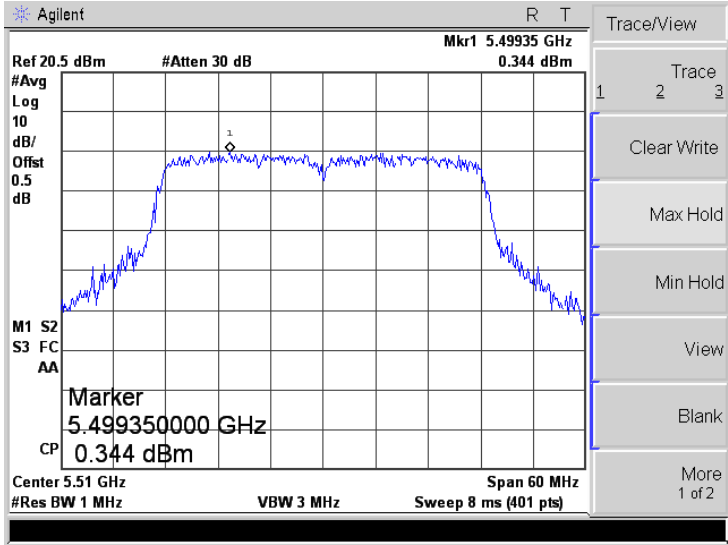
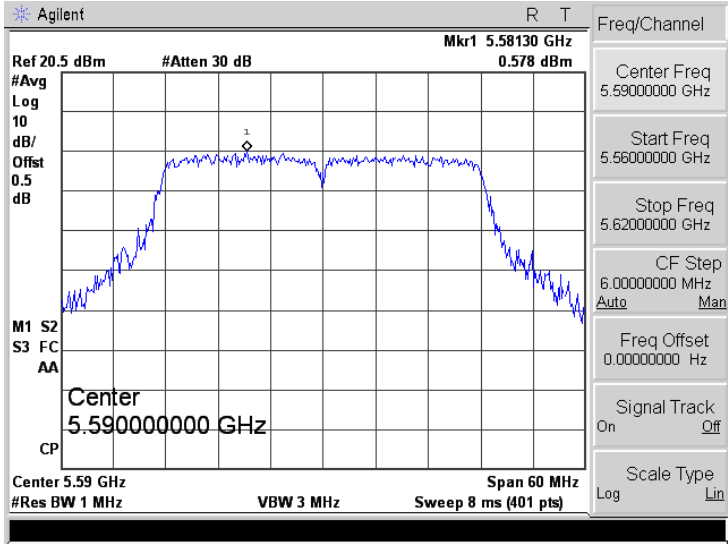
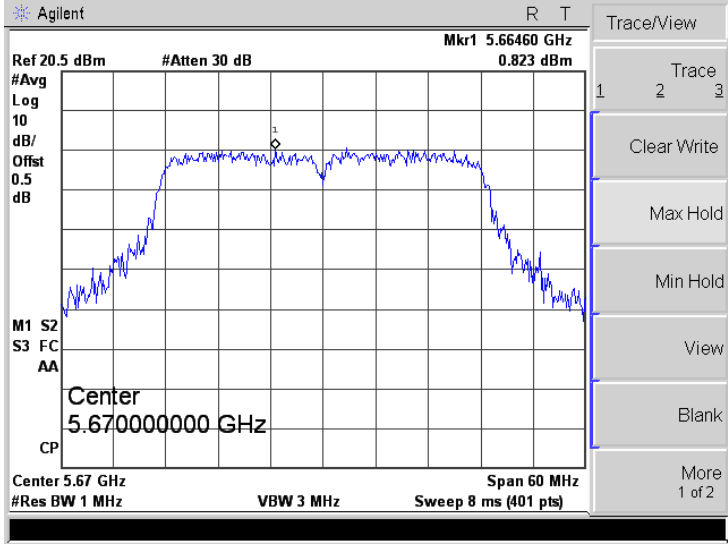
Mode:	802.11n-HT20
5260MHz	
5280MHz	
5320MHz	

Mode:	802.11n-HT40
5270MHz	 <p>Agilent R T</p> <p>Ref 20.5 dBm #Atten 30 dB Mkr1 5.26640 GHz -0.083 dBm</p> <p>#Avg Log 10 dB/Offset 0.5 dB</p> <p>M1 S2 S3 FC AA</p> <p>Marker 5.266400000 GHz -0.083 dBm</p> <p>Center 5.27 GHz Span 60 MHz #Res BW 1 MHz VBW 3 MHz Sweep 8 ms (401 pts)</p> <p>Peak Search Meas Tools Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2</p>
5310MHz	 <p>Agilent R T</p> <p>Ref 20.5 dBm #Atten 30 dB Mkr1 5.30775 GHz 0.26 dBm</p> <p>#Avg Log 10 dB/Offset 0.5 dB</p> <p>M1 S2 S3 FC AA</p> <p>Marker 5.307750000 GHz 0.26 dBm</p> <p>Center 5.31 GHz Span 60 MHz #Res BW 1 MHz VBW 3 MHz Sweep 8 ms (401 pts)</p> <p>Peak Search Meas Tools Next Peak Next Pk Right Next Pk Left Min Search Pk-Pk Search More 1 of 2</p>

➤ Antenna 2: 5470-5725MHz

Mode:	802.11a
5500MHz	
5600MHz	
5700MHz	

Mode:	802.11n-HT20
5500MHz	
5600MHz	
5700MHz	

Mode:	802.11n-HT40
5510MHz	
5590MHz	
5670MHz	

7. Emission Bandwidth and Occupied Bandwidth

7.1 Standard Applicable

According to 15.407(a) and (e):

(1) For the band 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

7.2 Test Procedure

According to 789033 D02 v02r0r section C&D, the following is the measurement procedure.

1. Emission Bandwidth (EBW)

- a) Set RBW = approximately 1% of the emission bandwidth.
- b) Set the VBW > RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare

this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

2. Minimum Emission Bandwidth for the band 5.725-5.85 GHz

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times \text{RBW}$.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

D. 99 Percent Occupied Bandwidth

The 99-percent occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission. Measurement of the 99-percent occupied bandwidth is required only as a condition for using the optional band-edge measurement techniques described in section II.G.3.d). Measurements of 99-percent occupied bandwidth may also optionally be used in lieu of the EBW to 789033 D02 v02r01 General UNII Test Procedures New Rules v01 define the minimum frequency range over which the spectrum is integrated when measuring maximum conducted output power as described in section II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with 15.407(a).

The following procedure shall be used for measuring (99 %) power bandwidth:

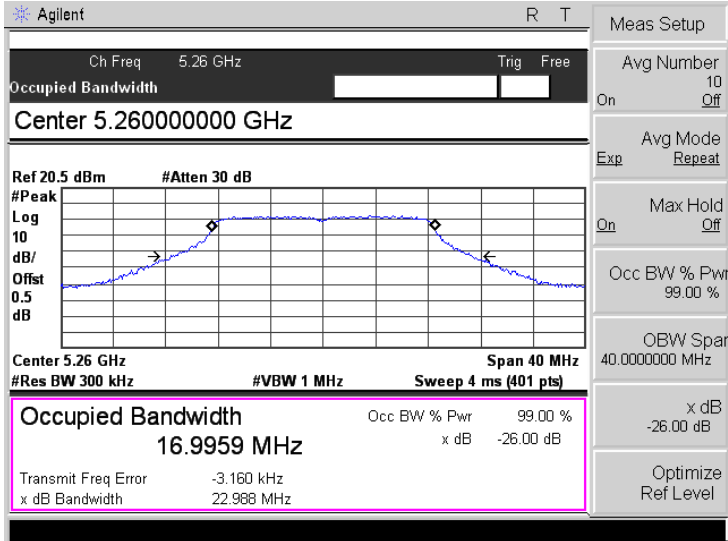
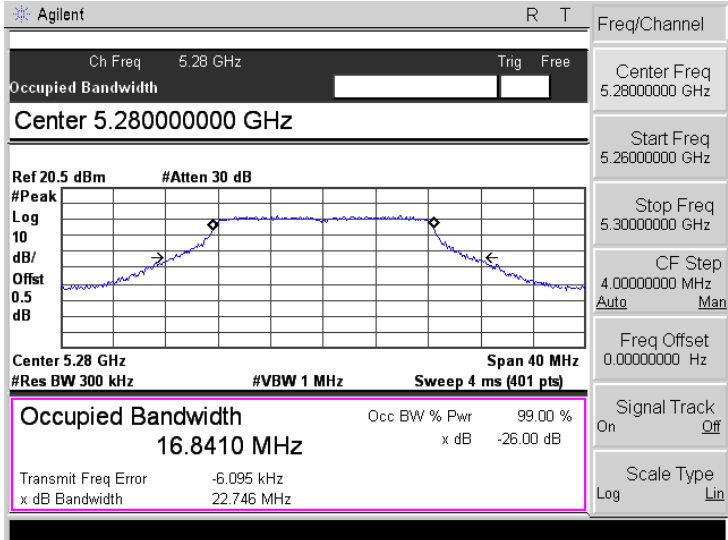
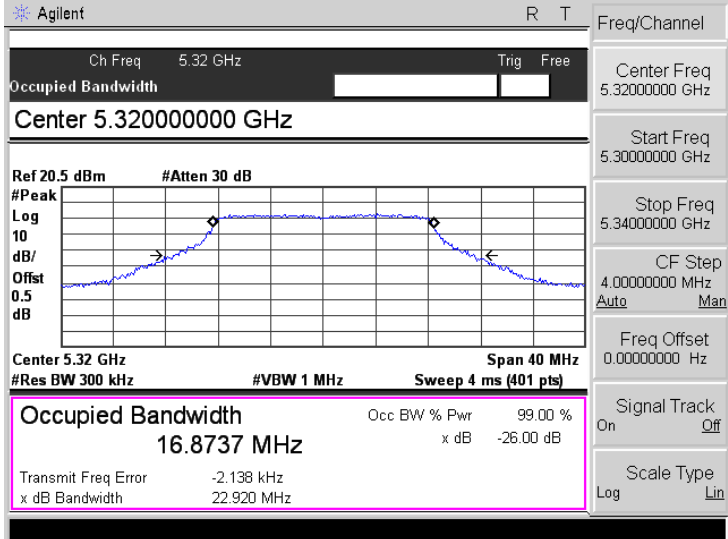
1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW $\geq 3 * \text{RBW}$
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

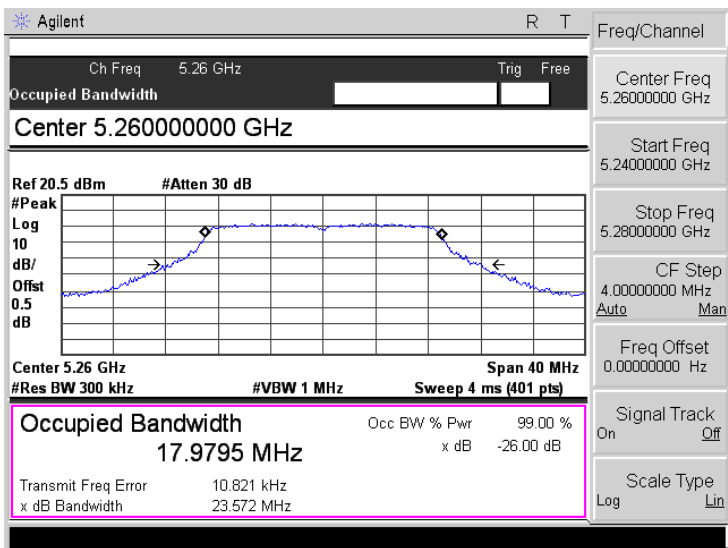
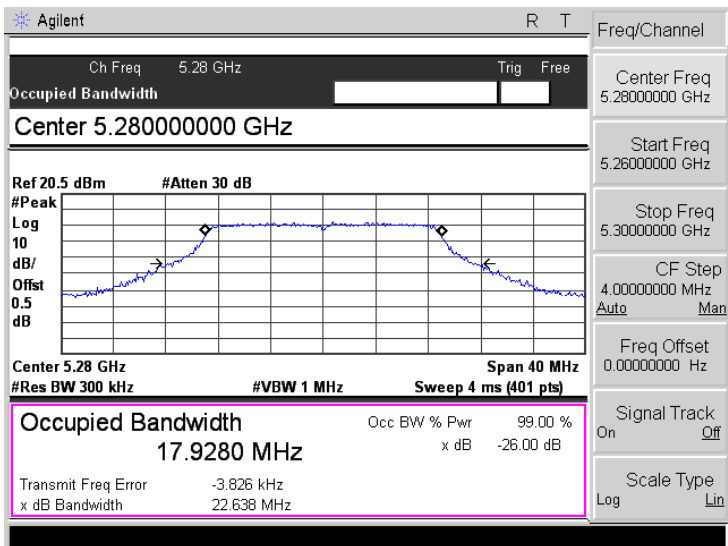
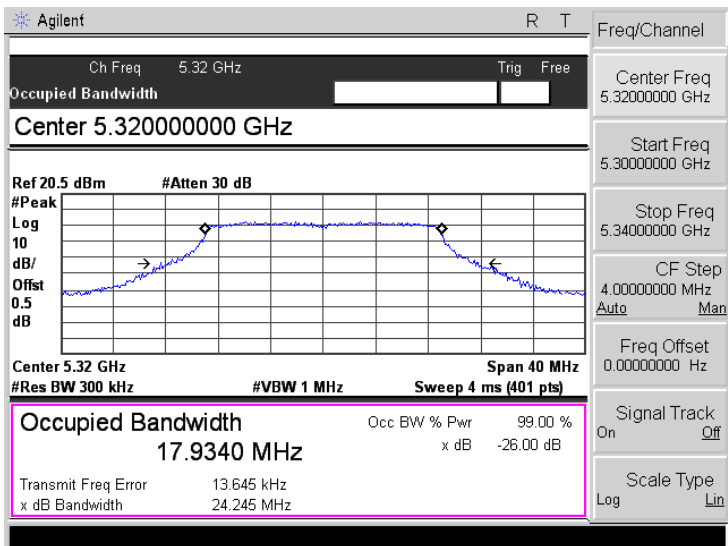
7.3 Summary of Test Results/Plots

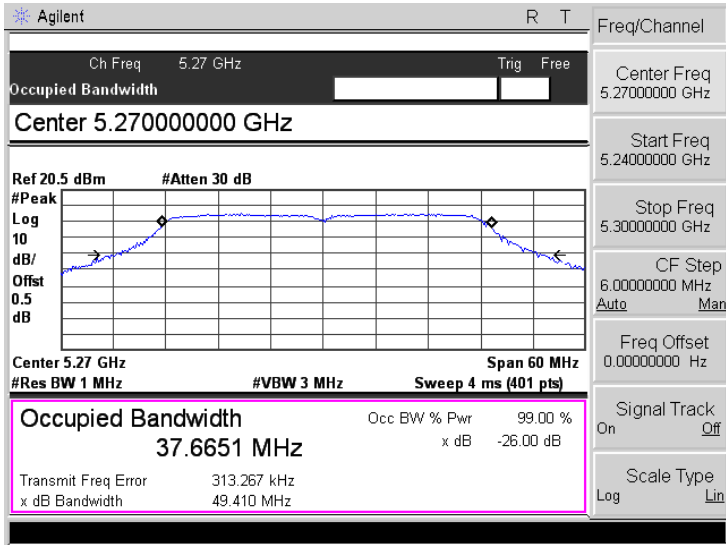
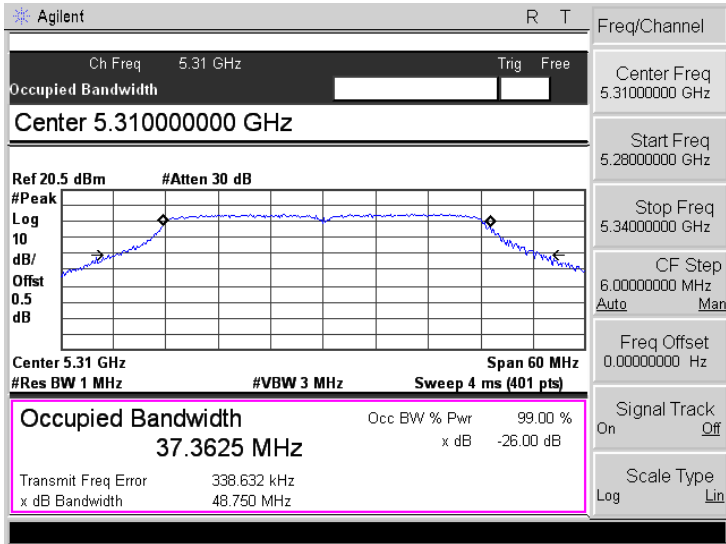
U-NII-2A: 5250-5350MHz						
Test Mode	Test Channel MHz	26 dB Bandwidth MHz		99% Bandwidth MHz		Limit MHz
		ANT1	ANT2	ANT1	ANT2	
802.11a	5260	22.988	22.364	16.9959	16.9045	Pass
	5280	22.746	22.665	16.8410	16.8698	Pass
	5320	22.920	22.770	16.8737	16.8819	Pass
802.11n-HT20	5260	23.572	23.749	17.9795	17.9321	Pass
	5280	22.638	22.898	17.9280	17.8954	Pass
	5320	24.245	24.006	17.9340	17.9035	Pass
802.11n-HT40	5270	49.410	48.344	37.6651	37.5111	Pass
	5310	48.750	49.335	37.3625	37.4378	Pass

U-NII-2C: 5470-5725MHz						
Test Mode	Test Channel MHz	26 dB Bandwidth MHz		99% Bandwidth MHz		Limit MHz
		ANT1	ANT2	ANT1	ANT2	
802.11a	5500	22.188	22.939	16.8594	16.9763	Pass
	5600	22.692	22.939	16.7336	16.8875	Pass
	5700	23.264	23.276	16.8950	16.8559	Pass
802.11n-HT20	5500	23.639	23.815	17.9233	17.9566	Pass
	5600	23.606	23.169	17.8474	17.9487	Pass
	5700	23.115	23.169	17.9509	17.9161	Pass
802.11n-HT40	5510	49.840	49.364	37.3193	37.4003	Pass
	5590	49.222	49.148	37.4907	37.4561	Pass
	5670	49.265	49.501	37.4887	37.5615	Pass

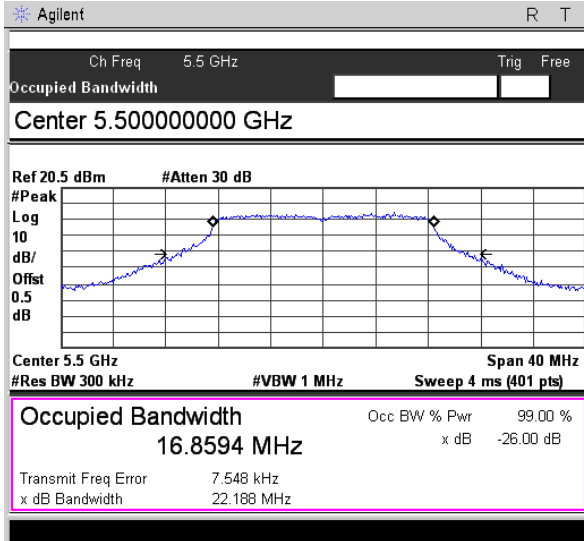
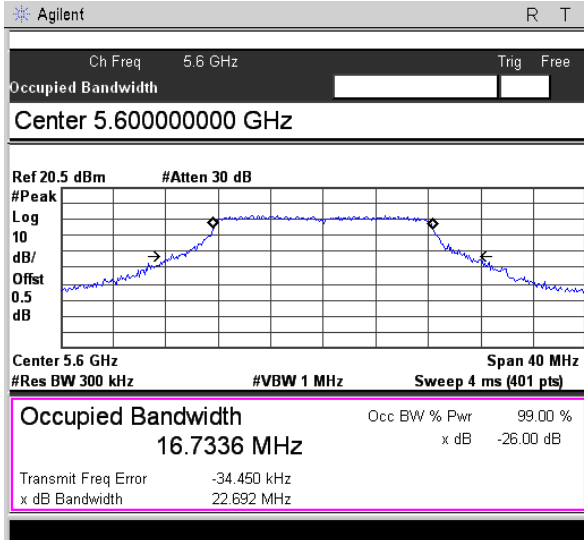
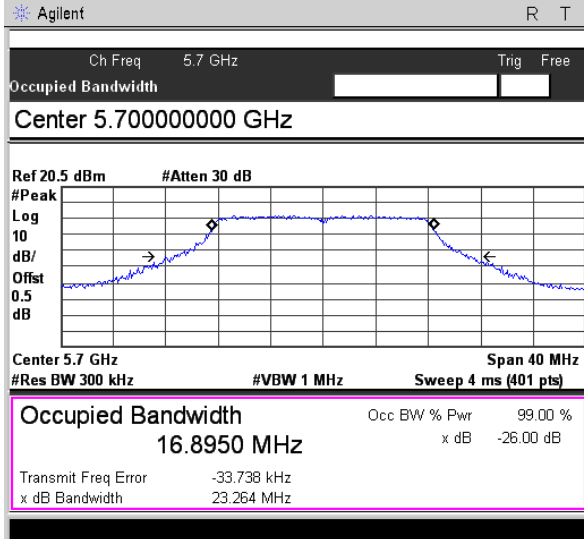
➤ Antenna 1: 5250-5350MHz

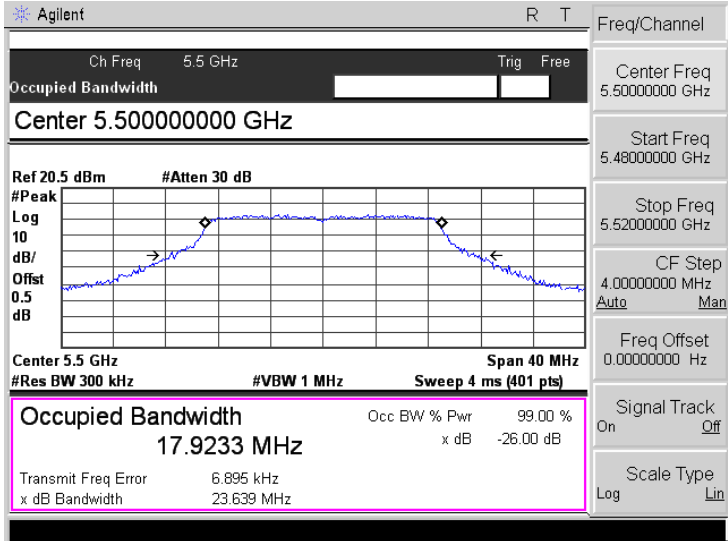
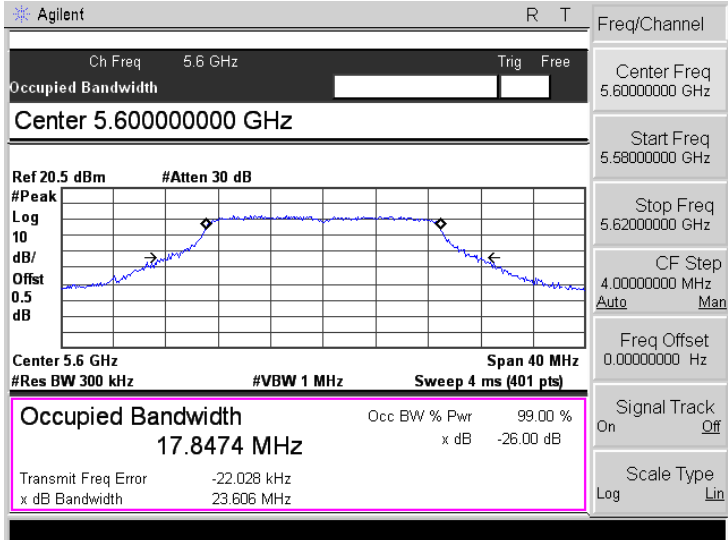
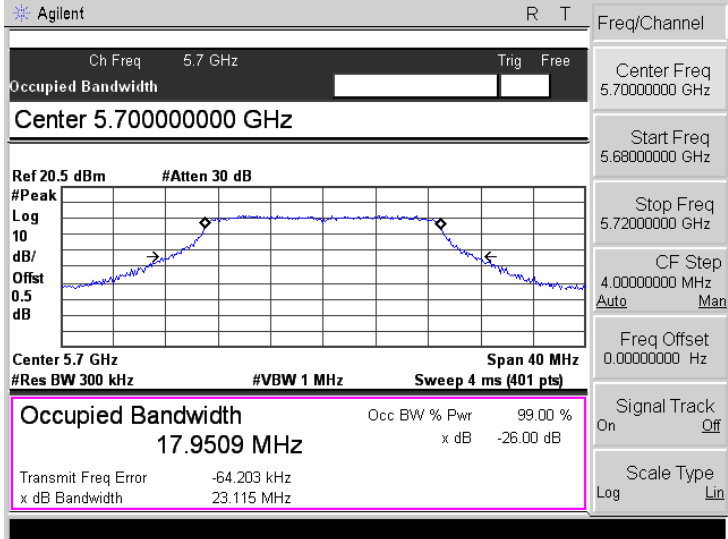
Mode:	802.11a
5260MHz	
5280MHz	
5320MHz	

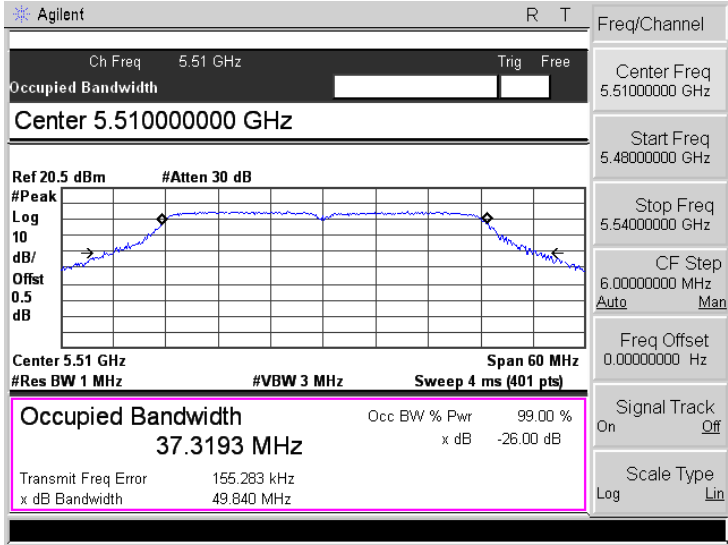
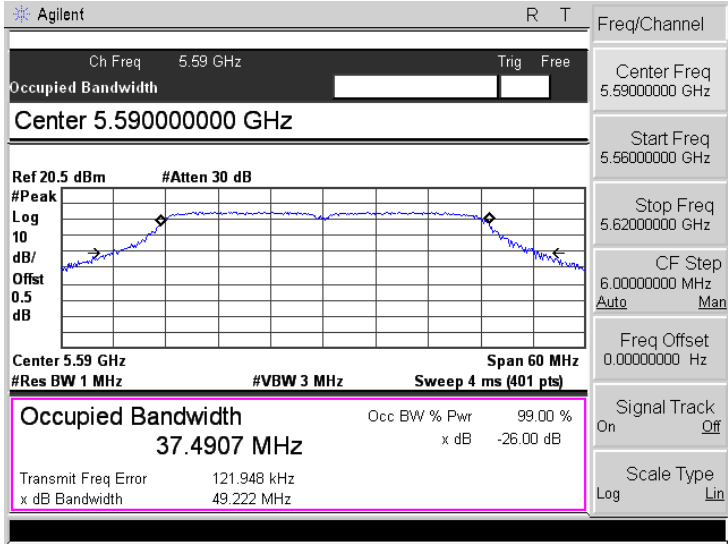
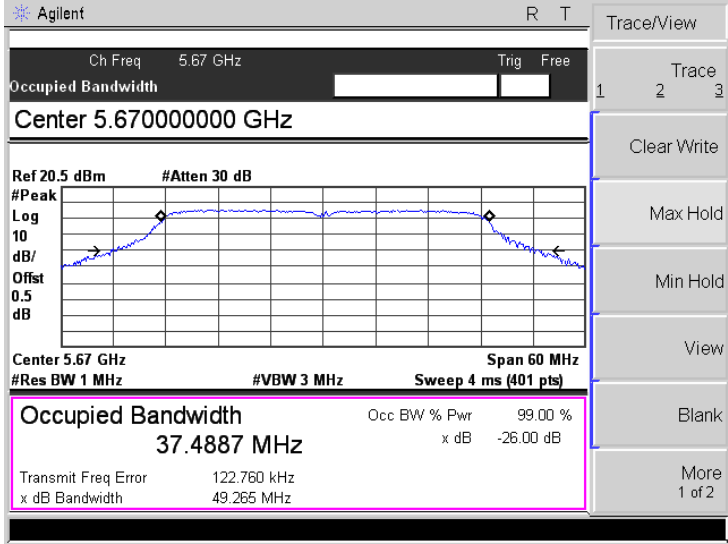
Mode:	802.11n-HT20
5260MHz	
5280MHz	
5320MHz	

Mode:	802.11n-HT40
5270MHz	 <p>The screenshot shows the Agilent Spectrum Analyzer interface. The center frequency is 5.27 GHz. The occupied bandwidth is 37.6651 MHz. The transmit frequency error is 313.267 kHz. The x dB bandwidth is 49.410 MHz. The signal track is on, and the scale type is log.</p>
5310MHz	 <p>The screenshot shows the Agilent Spectrum Analyzer interface. The center frequency is 5.31 GHz. The occupied bandwidth is 37.3625 MHz. The transmit frequency error is 338.632 kHz. The x dB bandwidth is 48.750 MHz. The signal track is on, and the scale type is log.</p>

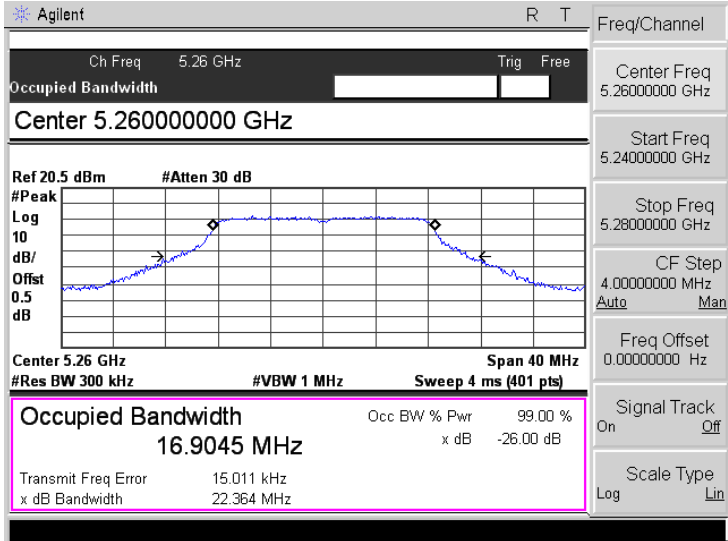
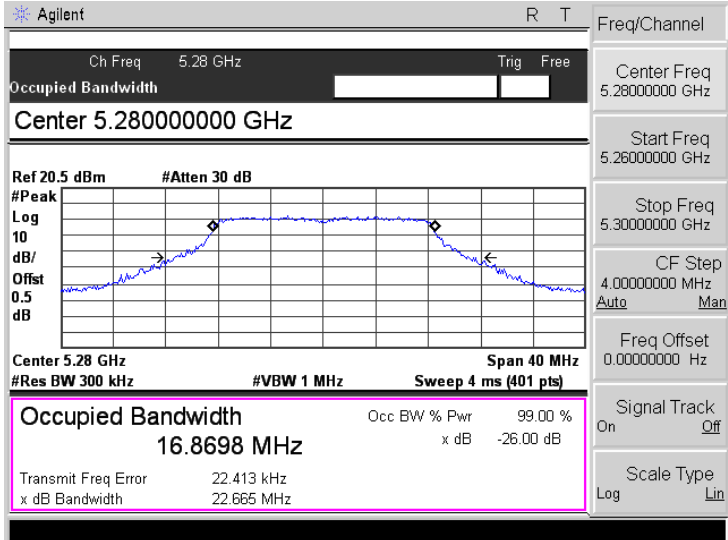
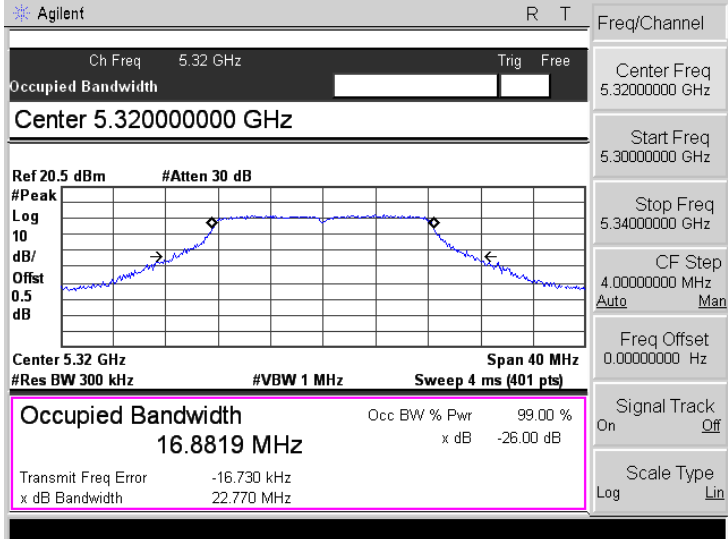
➤ Antenna 1: 5470-5725MHz

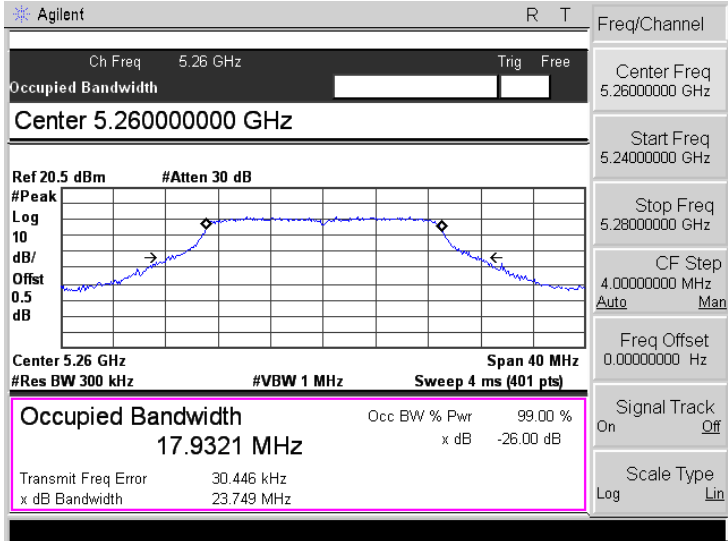
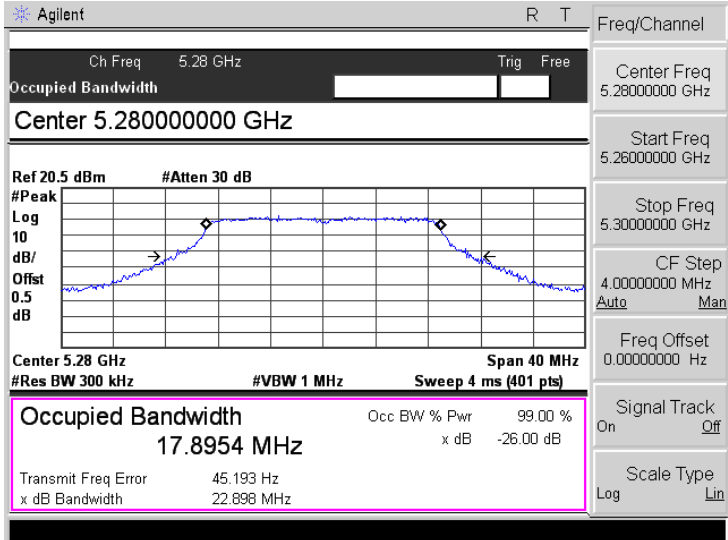
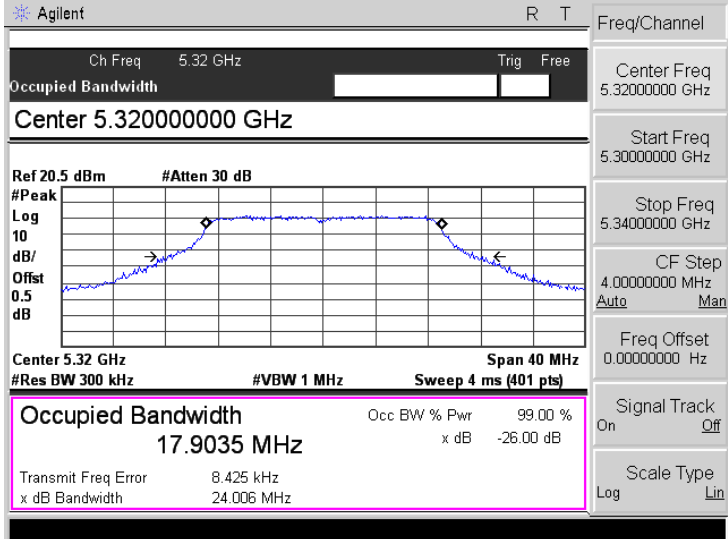
Mode:	802.11a
5500MHz	
5600MHz	
5700MHz	

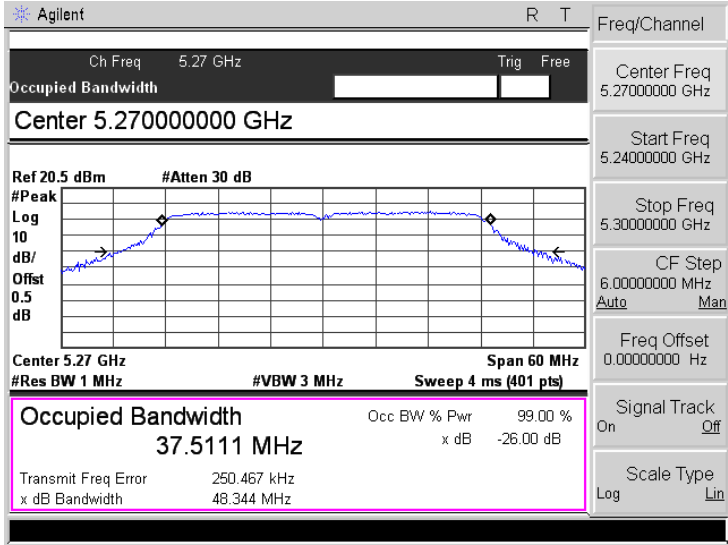
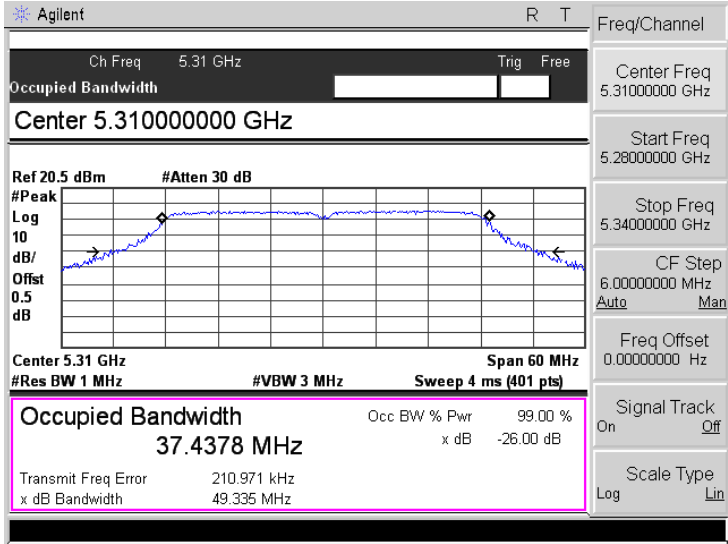
Mode:	802.11n-HT20
5500MHz	
5600MHz	
5700MHz	

Mode:	802.11n-HT40
5510MHz	
5590MHz	
5670MHz	

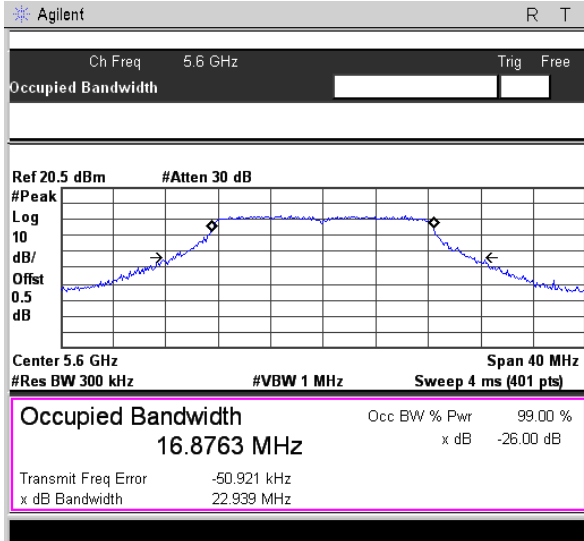
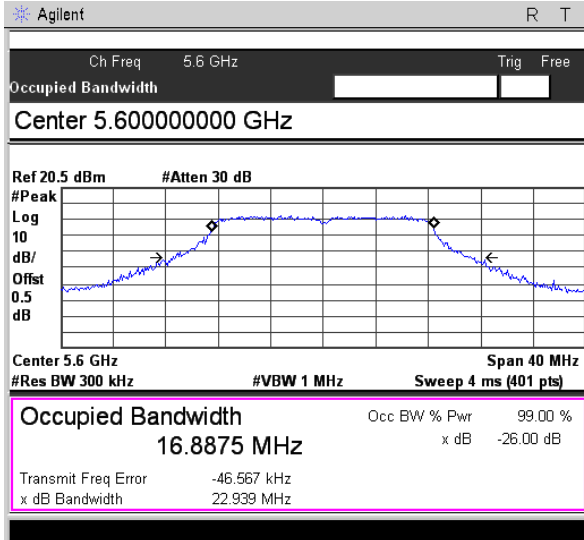
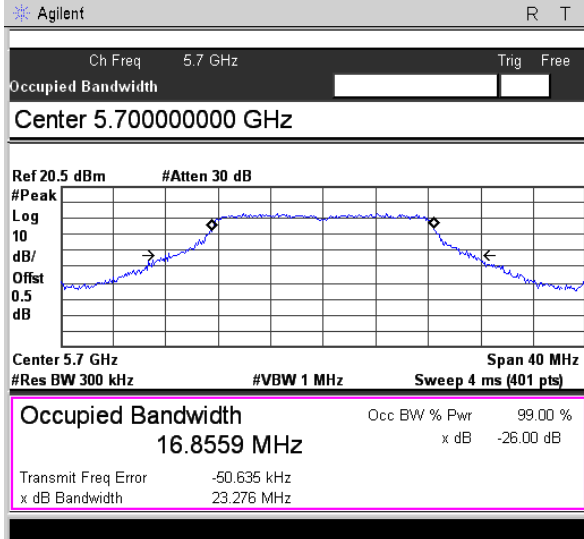
➤ Antenna 2: 5250-5350MHz

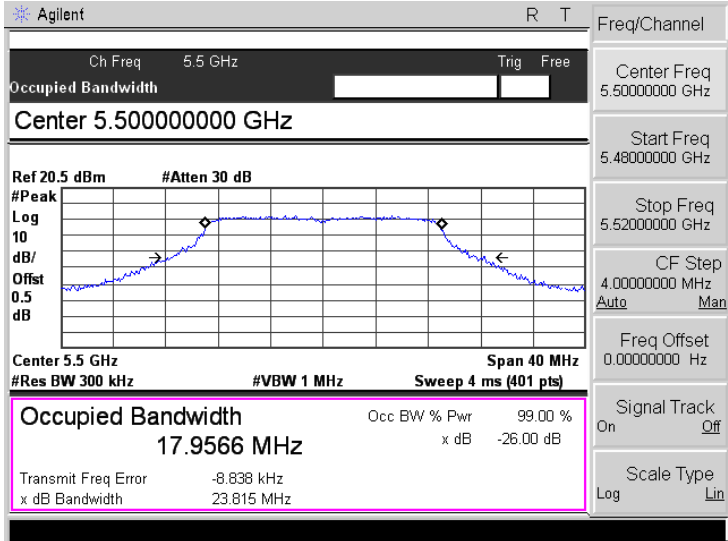
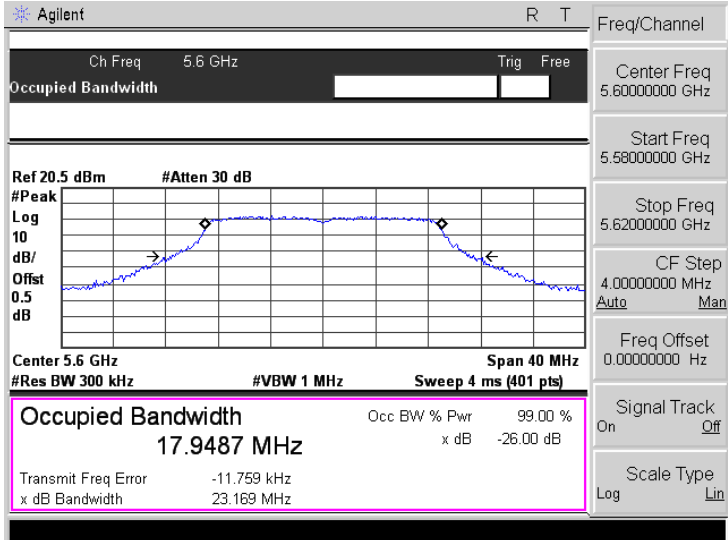
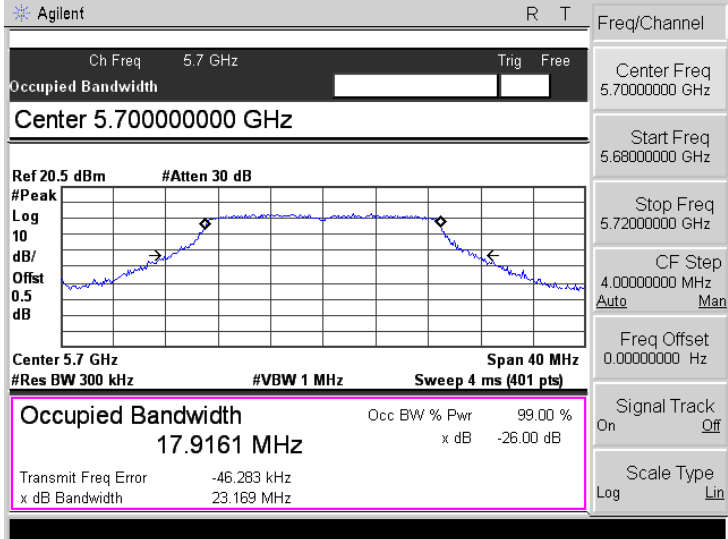
Mode:	802.11a
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5280MHz	
5320MHz	

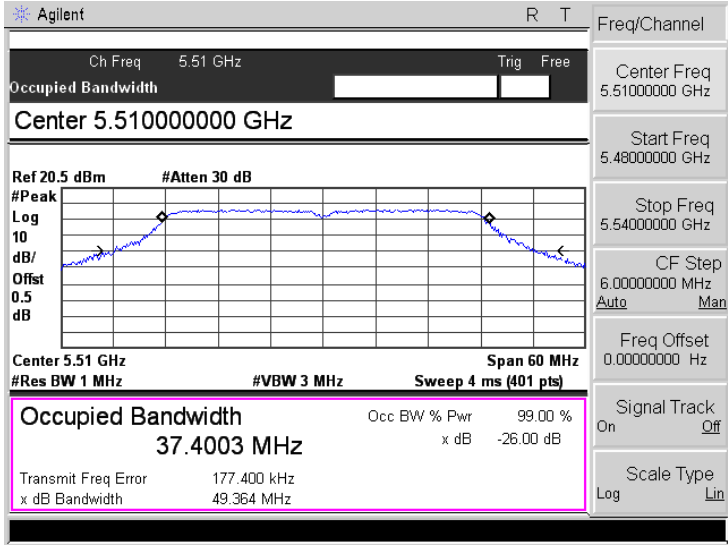
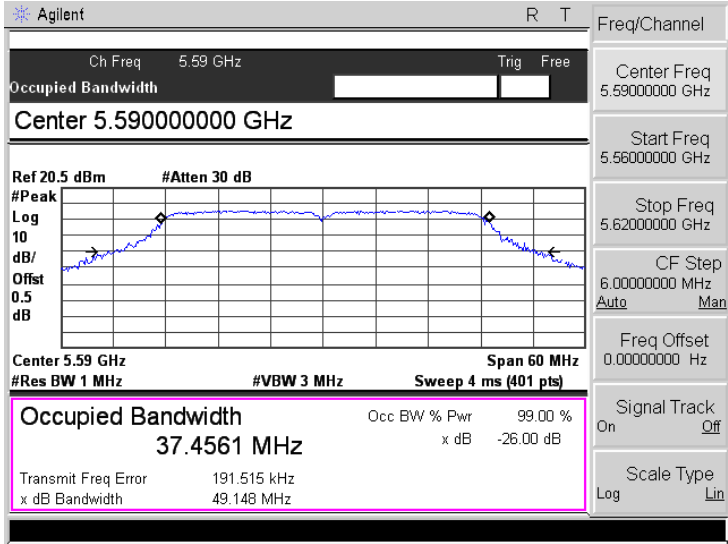
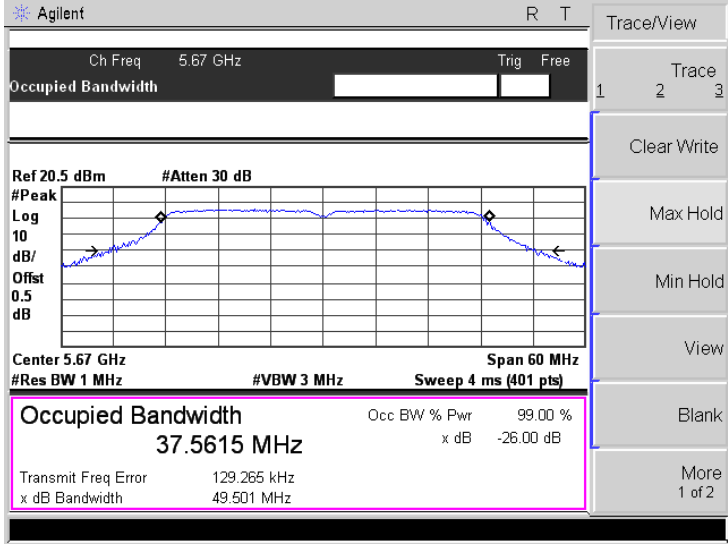
Mode:	802.11n-HT20
5260MHz	 <p>Agilent R T</p> <p>Ch Freq 5.26 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Center 5.26000000 GHz</p> <p>Ref 20.5 dBm #Atten 30 dB</p> <p>#Peak Log 10 dB/ Offst 0.5 dB</p> <p>Center 5.26 GHz Span 40 MHz</p> <p>#Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 17.9321 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -26.00 dB</p> <p>Transmit Freq Error 30.446 kHz</p> <p>x dB Bandwidth 23.749 MHz</p> <p>Freq/Channel</p> <p>Center Freq 5.26000000 GHz</p> <p>Start Freq 5.24000000 GHz</p> <p>Stop Freq 5.28000000 GHz</p> <p>CF Step 4.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
5280MHz	 <p>Agilent R T</p> <p>Ch Freq 5.28 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Center 5.28000000 GHz</p> <p>Ref 20.5 dBm #Atten 30 dB</p> <p>#Peak Log 10 dB/ Offst 0.5 dB</p> <p>Center 5.28 GHz Span 40 MHz</p> <p>#Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 17.8954 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -26.00 dB</p> <p>Transmit Freq Error 45.193 Hz</p> <p>x dB Bandwidth 22.898 MHz</p> <p>Freq/Channel</p> <p>Center Freq 5.28000000 GHz</p> <p>Start Freq 5.26000000 GHz</p> <p>Stop Freq 5.30000000 GHz</p> <p>CF Step 4.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
5320MHz	 <p>Agilent R T</p> <p>Ch Freq 5.32 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Center 5.32000000 GHz</p> <p>Ref 20.5 dBm #Atten 30 dB</p> <p>#Peak Log 10 dB/ Offst 0.5 dB</p> <p>Center 5.32 GHz Span 40 MHz</p> <p>#Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 17.9035 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -26.00 dB</p> <p>Transmit Freq Error 8.425 kHz</p> <p>x dB Bandwidth 24.006 MHz</p> <p>Freq/Channel</p> <p>Center Freq 5.32000000 GHz</p> <p>Start Freq 5.30000000 GHz</p> <p>Stop Freq 5.34000000 GHz</p> <p>CF Step 4.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>

Mode:	802.11n-HT40
5270MHz	 <p>Agilent R T</p> <p>Ch Freq 5.27 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Center 5.27000000 GHz</p> <p>Ref 20.5 dBm #Atten 30 dB</p> <p>#Peak Log 10 dB/ Offst 0.5 dB</p> <p>Center 5.27 GHz Span 60 MHz</p> <p>#Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 37.5111 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -26.00 dB</p> <p>Transmit Freq Error 250.467 kHz</p> <p>x dB Bandwidth 48.344 MHz</p> <p>Freq/Channel</p> <p>Center Freq 5.27000000 GHz</p> <p>Start Freq 5.24000000 GHz</p> <p>Stop Freq 5.30000000 GHz</p> <p>CF Step 6.00000000 MHz</p> <p>Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
5310MHz	 <p>Agilent R T</p> <p>Ch Freq 5.31 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Center 5.31000000 GHz</p> <p>Ref 20.5 dBm #Atten 30 dB</p> <p>#Peak Log 10 dB/ Offst 0.5 dB</p> <p>Center 5.31 GHz Span 60 MHz</p> <p>#Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 37.4378 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -26.00 dB</p> <p>Transmit Freq Error 210.971 kHz</p> <p>x dB Bandwidth 49.335 MHz</p> <p>Freq/Channel</p> <p>Center Freq 5.31000000 GHz</p> <p>Start Freq 5.28000000 GHz</p> <p>Stop Freq 5.34000000 GHz</p> <p>CF Step 6.00000000 MHz</p> <p>Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>

➤ Antenna 2: 5470-5725MHz

Mode:	802.11a
5500MHz	 <p>Agilent R T</p> <p>Ch Freq 5.6 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 20.5 dBm #Atten 30 dB</p> <p>#Peak Log 10 dB/ Offst 0.5 dB</p> <p>Center 5.6 GHz Span 40 MHz</p> <p>#Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 16.8763 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -26.00 dB</p> <p>Transmit Freq Error -50.921 kHz</p> <p>x dB Bandwidth 22.939 MHz</p> <p>Freq/Channel</p> <p>Center Freq 5.60000000 GHz</p> <p>Start Freq 5.58000000 GHz</p> <p>Stop Freq 5.62000000 GHz</p> <p>CF Step 4.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
5600MHz	 <p>Agilent R T</p> <p>Ch Freq 5.6 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Center 5.60000000 GHz</p> <p>Ref 20.5 dBm #Atten 30 dB</p> <p>#Peak Log 10 dB/ Offst 0.5 dB</p> <p>Center 5.6 GHz Span 40 MHz</p> <p>#Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 16.8875 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -26.00 dB</p> <p>Transmit Freq Error -46.567 kHz</p> <p>x dB Bandwidth 22.939 MHz</p> <p>Freq/Channel</p> <p>Center Freq 5.60000000 GHz</p> <p>Start Freq 5.58000000 GHz</p> <p>Stop Freq 5.62000000 GHz</p> <p>CF Step 4.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
5700MHz	 <p>Agilent R T</p> <p>Ch Freq 5.7 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Center 5.70000000 GHz</p> <p>Ref 20.5 dBm #Atten 30 dB</p> <p>#Peak Log 10 dB/ Offst 0.5 dB</p> <p>Center 5.7 GHz Span 40 MHz</p> <p>#Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)</p> <p>Occupied Bandwidth 16.8559 MHz</p> <p>Occ BW % Pwr 99.00 %</p> <p>x dB -26.00 dB</p> <p>Transmit Freq Error -50.635 kHz</p> <p>x dB Bandwidth 23.276 MHz</p> <p>Freq/Channel</p> <p>Center Freq 5.70000000 GHz</p> <p>Start Freq 5.68000000 GHz</p> <p>Stop Freq 5.72000000 GHz</p> <p>CF Step 4.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>

Mode:	802.11n-HT20
5500MHz	
5600MHz	
5700MHz	

Mode:	802.11n-HT40
5510MHz	
5590MHz	
5670MHz	

8. Maximum Conducted Output Power

8.1 Standard Applicable

Section 15.407(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

8.2 Test Procedure

According to KDB789033 D02 v02r01 section E, the following is the measurement procedure.

- (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- (ii) Set RBW = 1 MHz.
- (iii) Set VBW ≥ 3 MHz.
- (iv) Number of points in sweep $\geq 2 \text{ Span} / \text{RBW}$. (This ensures that bin-to-bin spacing is $\leq \text{RBW}/2$, so that narrowband signals are not lost between frequency bins.)
- (v) Sweep time = auto.

- (vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- (vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.
- (viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
- (ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

8.3 Summary of Test Results/Plots

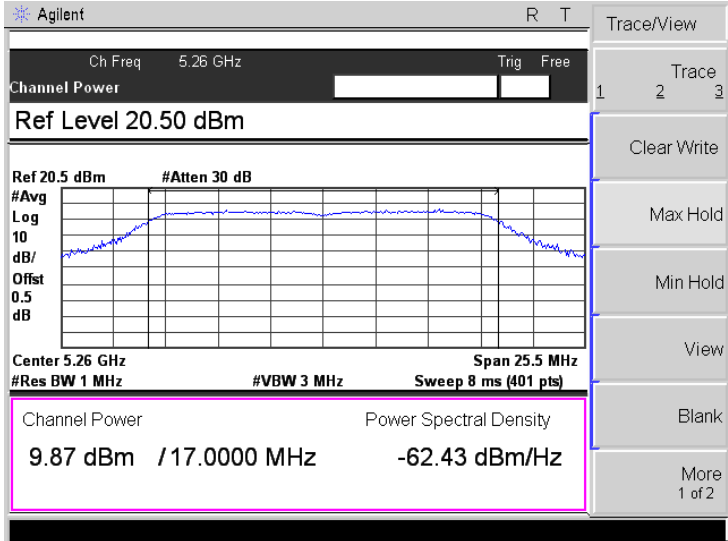
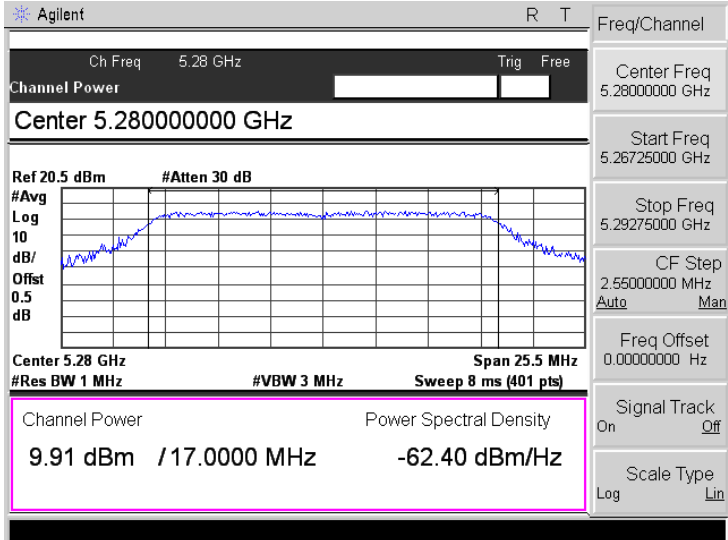
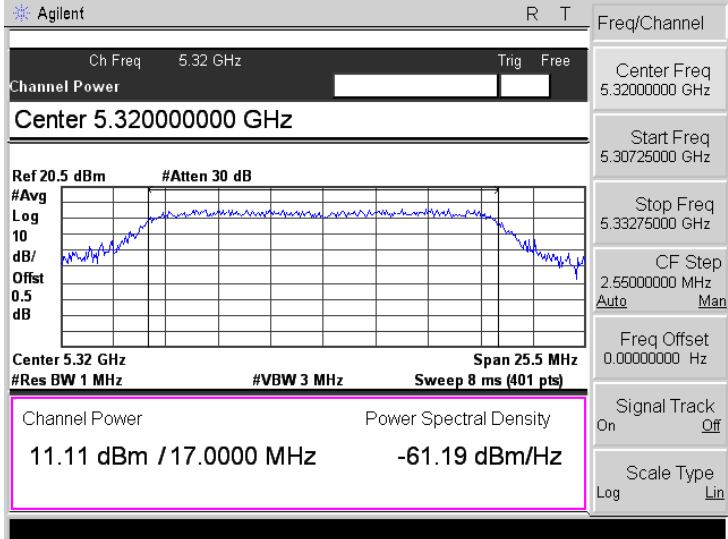
U-NII-2A: 5250-5350MHz					
Test mode	Frequency MHz	Output Power dBm		Total Output Power mW	Limit mW
		ANT1	ANT2		
802.11a	5260	9.87	10.29	/	100
	5280	9.91	9.67	/	100
	5320	11.11	10.63	/	100
802.11n-HT20	5260	5.08	5.50	6.77	50
	5280	5.93	5.71	7.64	50
	5320	6.19	6.23	8.36	50
802.11n-HT40	5270	7.82	7.43	11.59	50
	5310	8.54	8.22	13.78	50

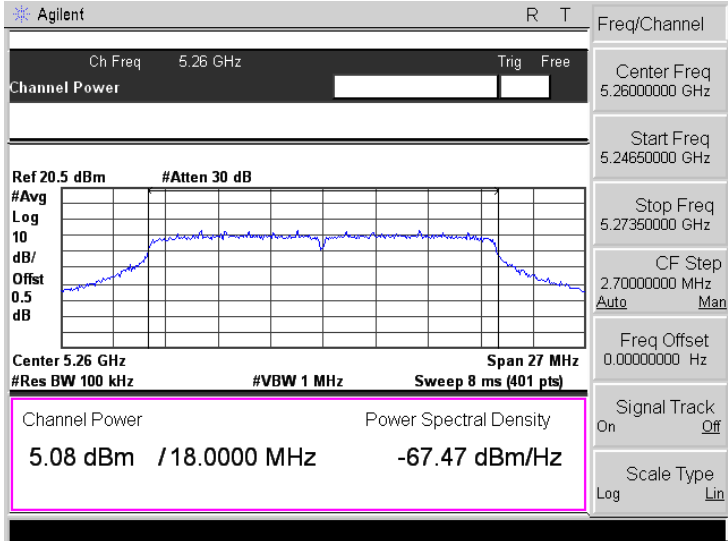
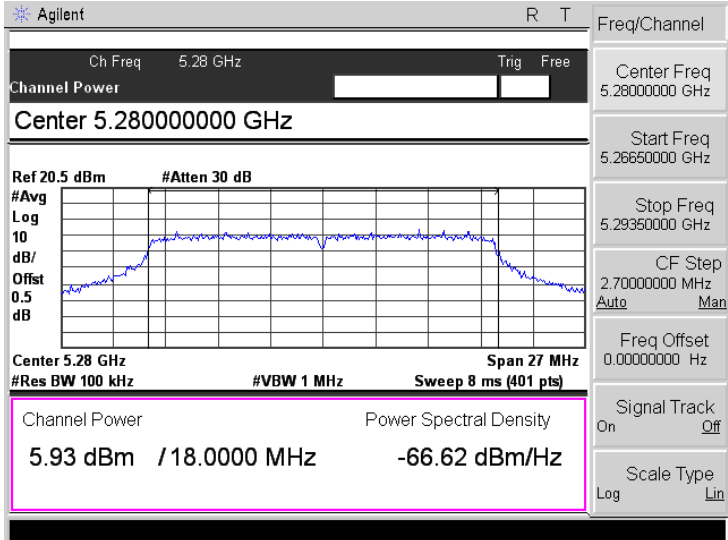
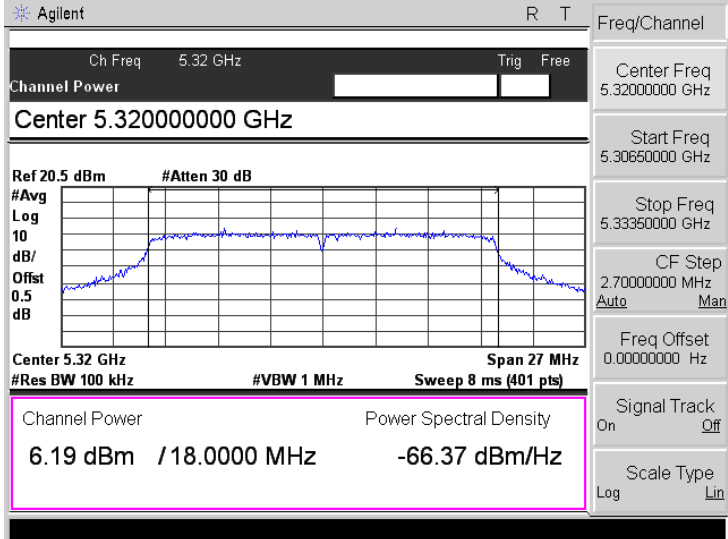
U-NII-2C: 5470-5725MHz					
Test mode	Frequency MHz	Output Power dBm		Total Output Power mW	Limit mW
		ANT1	ANT2		
802.11a	5500	11.05	11.00	/	100
	5600	10.88	10.48	/	100
	5700	10.24	10.75	/	100
802.11n-HT20	5500	6.23	5.92	8.11	50
	5600	5.85	5.23	7.18	50
	5700	6.57	6.66	9.17	50
802.11n-HT40	5510	9.16	7.89	14.39	50
	5590	9.35	8.95	16.46	50
	5670	9.21	9.86	18.02	50

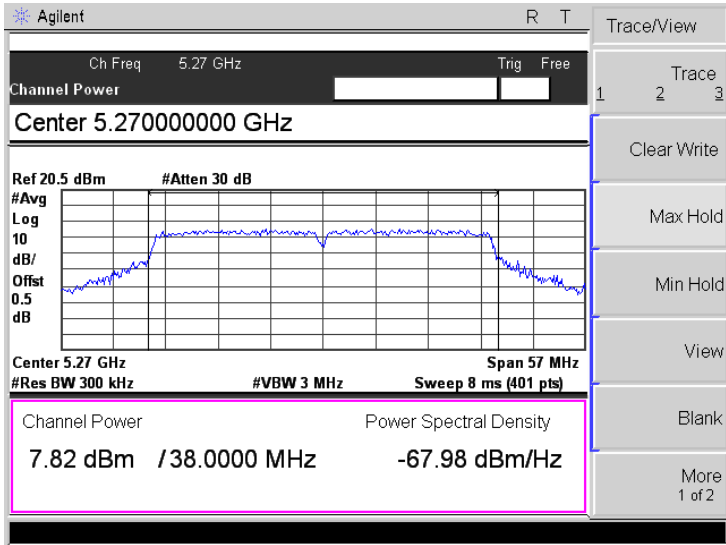
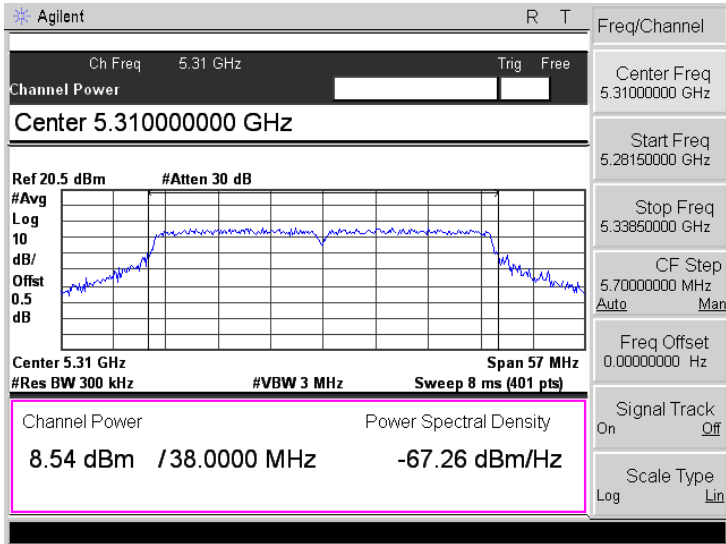
*SISO: For 5250-5350MHz, 5470-5725MHz: Limit=24-(10-6)=20dBm=100 mW

MIMO: For 5250-5350MHz, 5470-5725MHz: Limit=24-(13-6)=17dBm=50mW

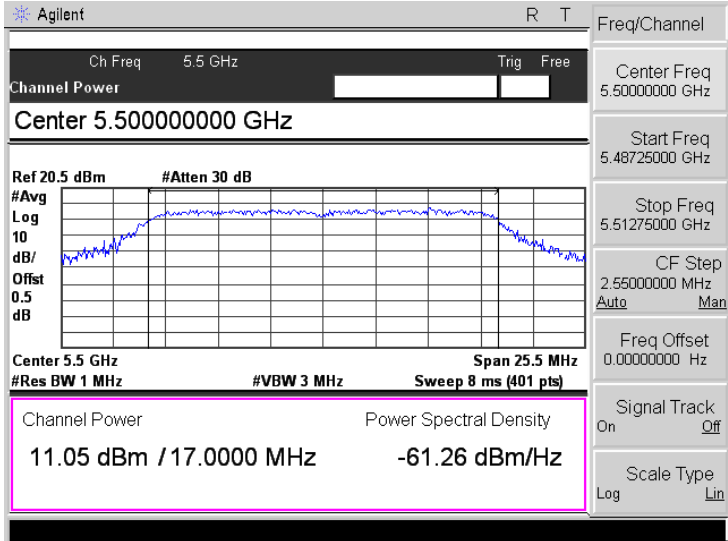
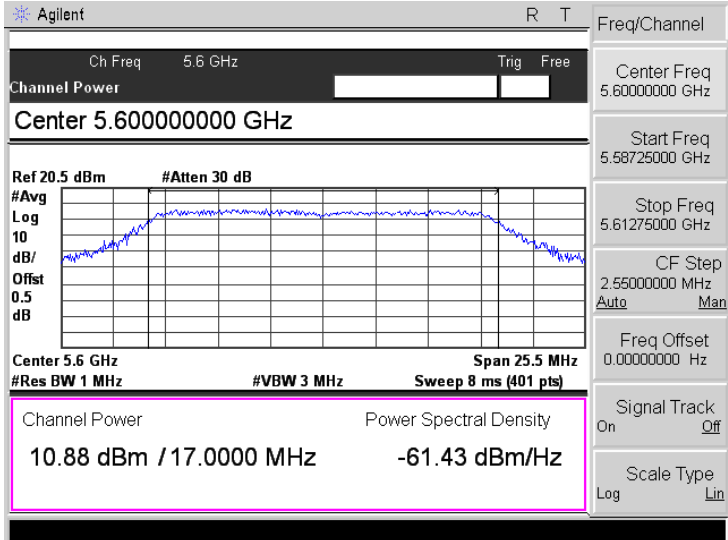
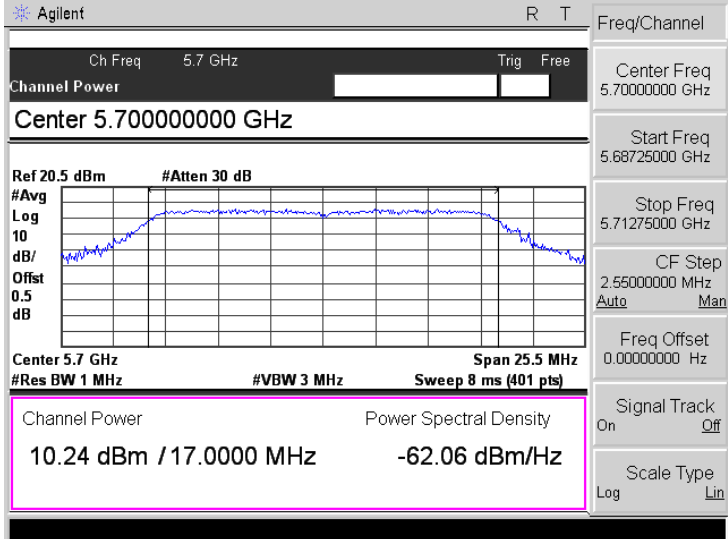
➤ Antenna 1: 5250-5350MHz

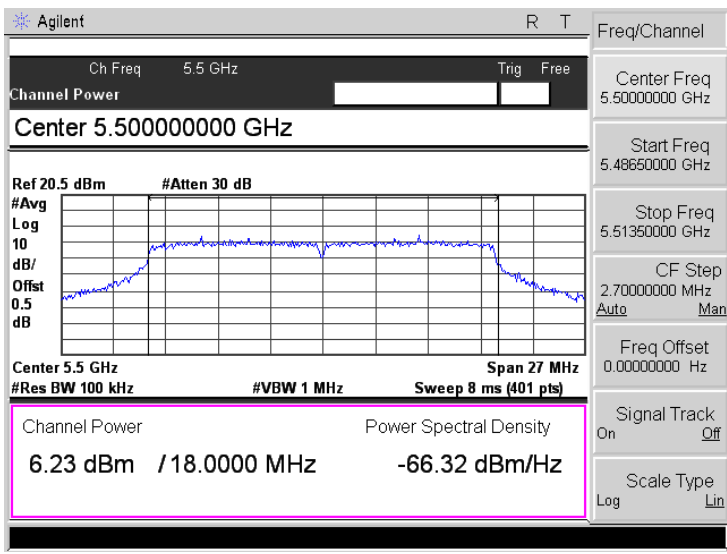
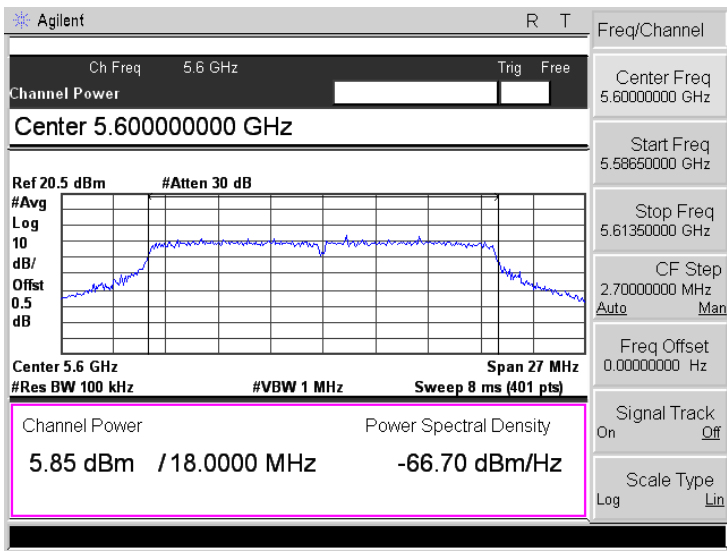
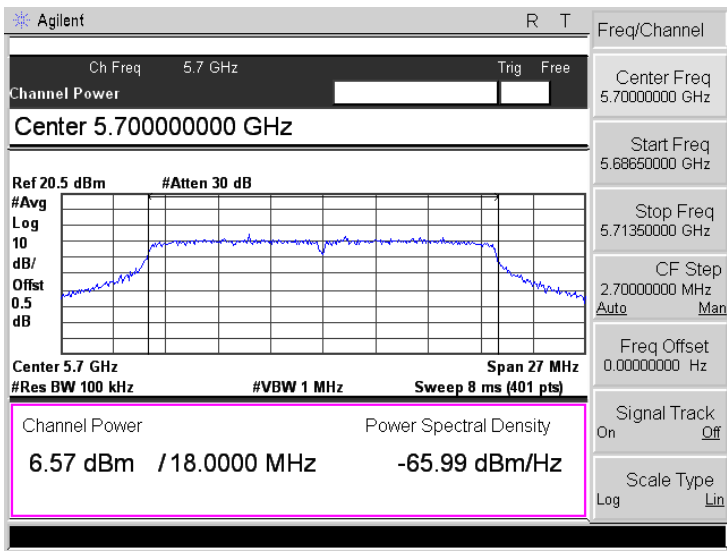
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5260MHz	
5280MHz	
5320MHz	

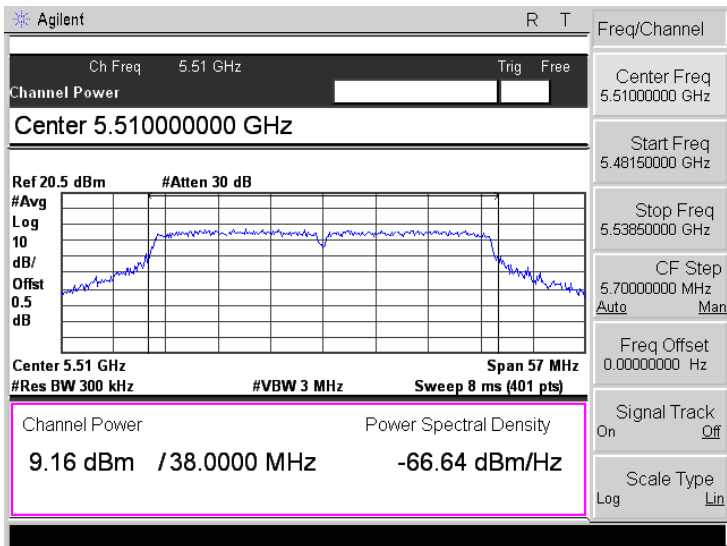
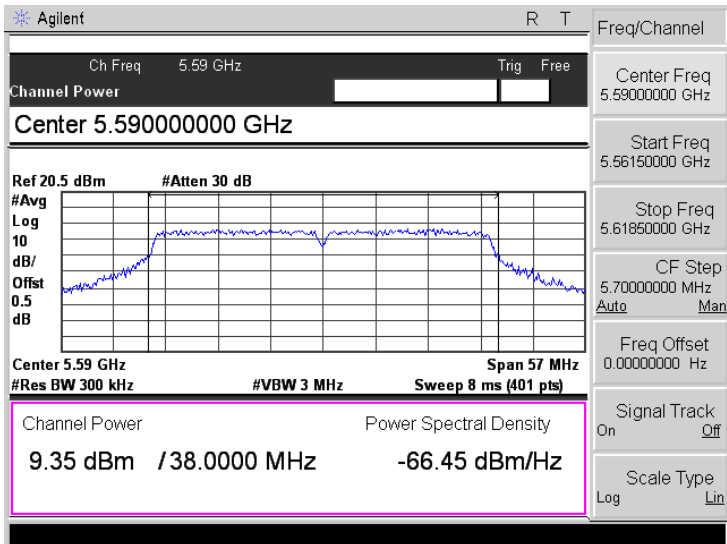
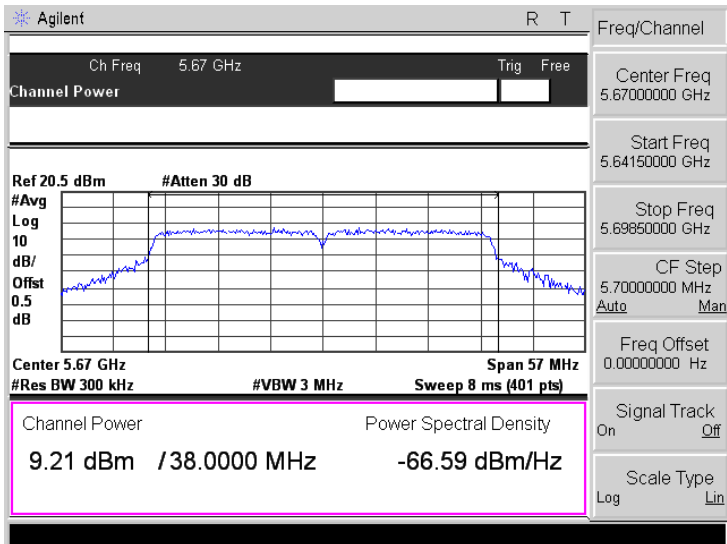
Mode:	802.11n-HT20
5260MHz	
5280MHz	
5320MHz	

Mode:	802.11n-HT40
5270MHz	
5310MHz	

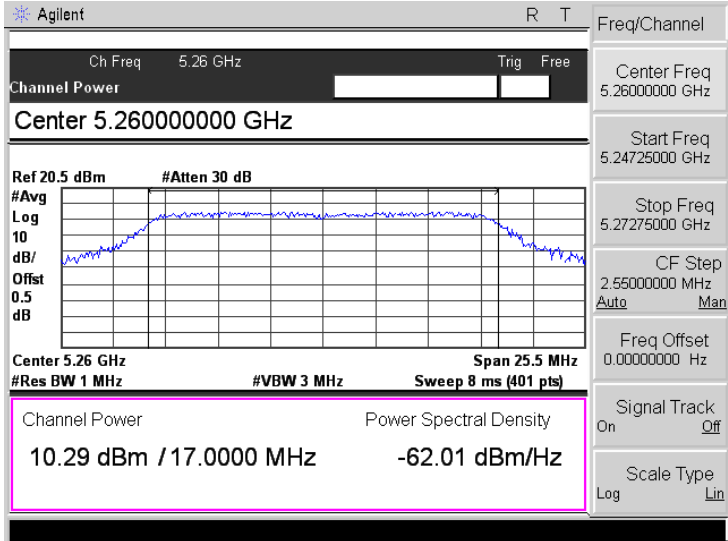
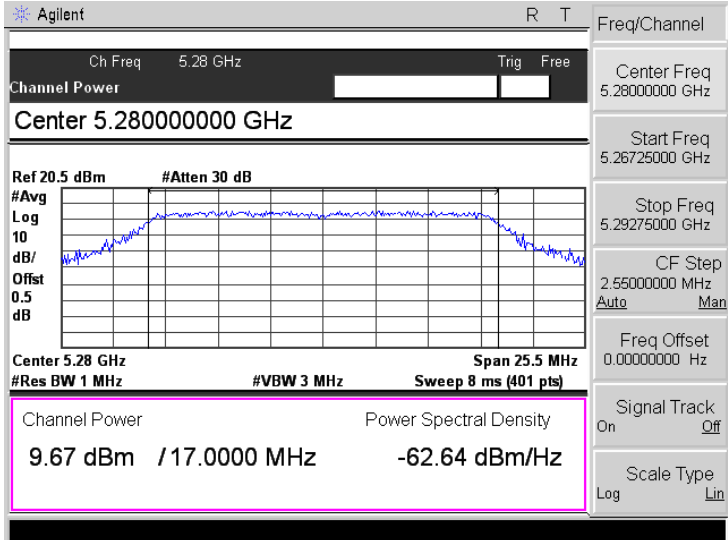
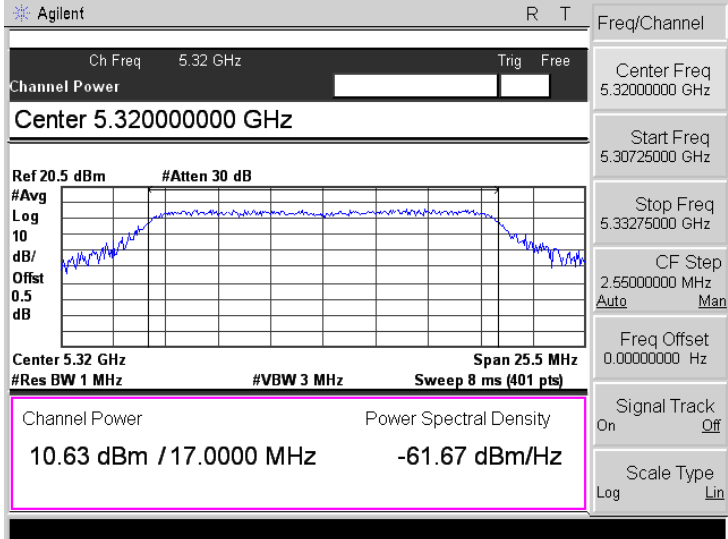
➤ Antenna 1: 5470-5725MHz

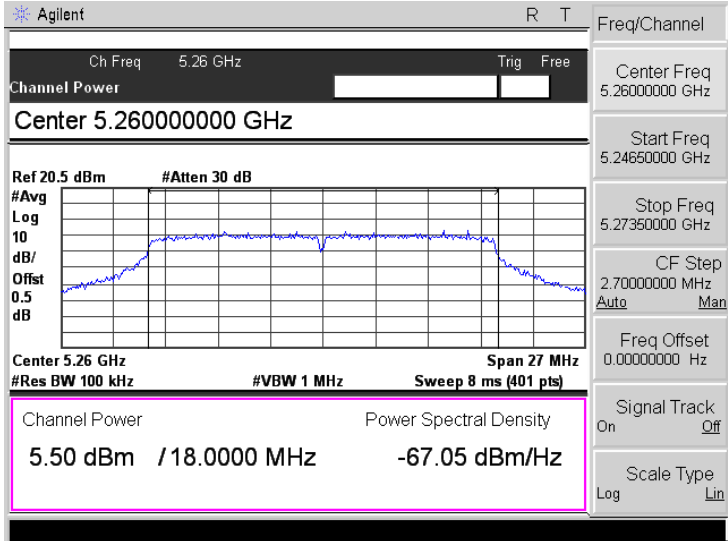
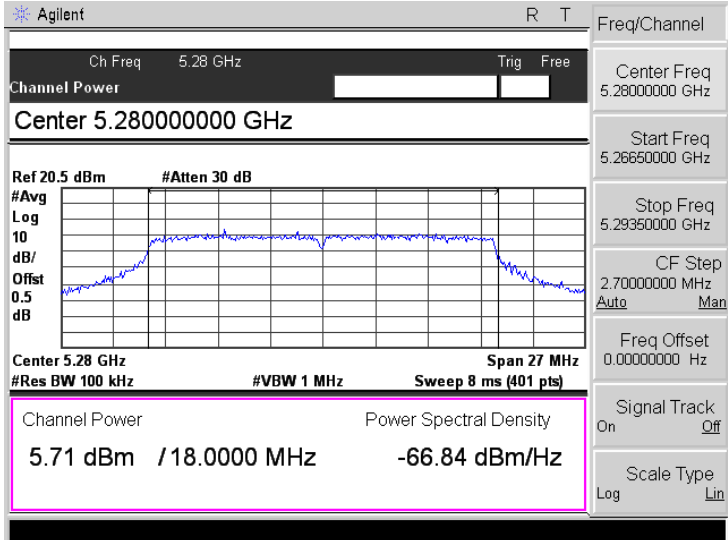
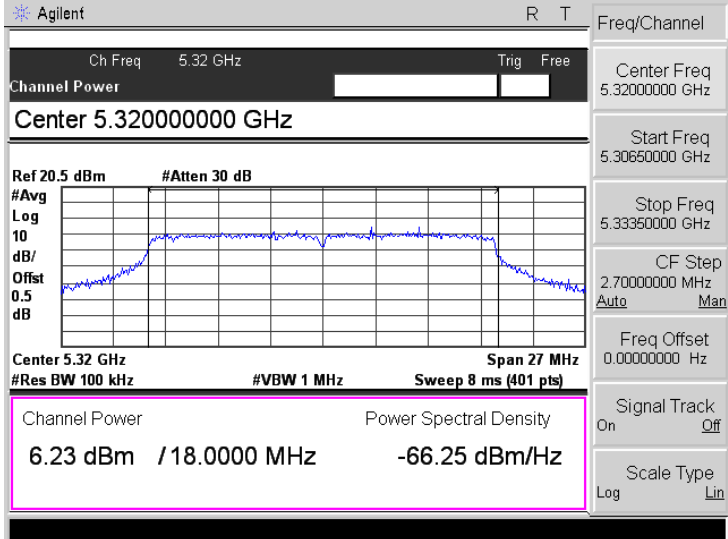
Mode:	802.11a
5500MHz	
5600MHz	
5700MHz	

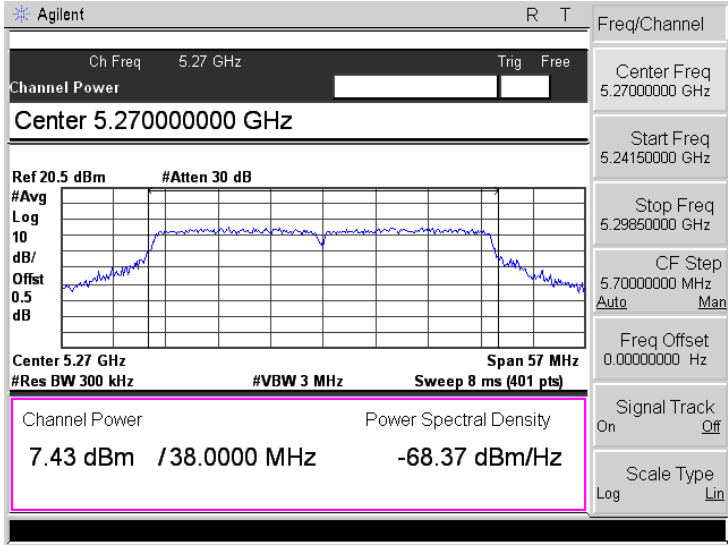
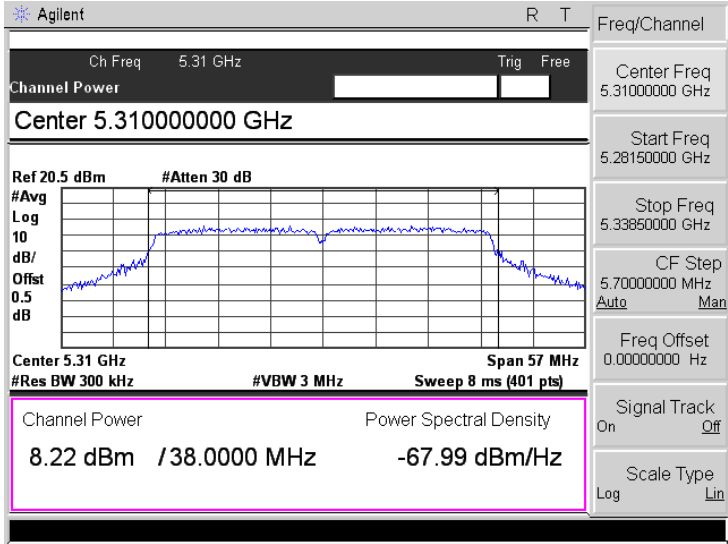
Mode:	802.11n-HT20
5500MHz	 <p>Agilent R T</p> <p>Ch Freq 5.5 GHz Trig Free</p> <p>Channel Power</p> <p>Center 5.50000000 GHz</p> <p>Ref 20.5 dBm #Atten 30 dB</p> <p>#Avg Log 10 dB/ Offst 0.5 dB</p> <p>Center 5.5 GHz Span 27 MHz</p> <p>#Res BW 100 kHz #VBW 1 MHz Sweep 8 ms (401 pts)</p> <p>Channel Power Power Spectral Density</p> <p>6.23 dBm / 18.0000 MHz -66.32 dBm/Hz</p> <p>Freq/Channel</p> <p>Center Freq 5.50000000 GHz</p> <p>Start Freq 5.48650000 GHz</p> <p>Stop Freq 5.51350000 GHz</p> <p>CF Step 2.70000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
5600MHz	 <p>Agilent R T</p> <p>Ch Freq 5.6 GHz Trig Free</p> <p>Channel Power</p> <p>Center 5.60000000 GHz</p> <p>Ref 20.5 dBm #Atten 30 dB</p> <p>#Avg Log 10 dB/ Offst 0.5 dB</p> <p>Center 5.6 GHz Span 27 MHz</p> <p>#Res BW 100 kHz #VBW 1 MHz Sweep 8 ms (401 pts)</p> <p>Channel Power Power Spectral Density</p> <p>5.85 dBm / 18.0000 MHz -66.70 dBm/Hz</p> <p>Freq/Channel</p> <p>Center Freq 5.60000000 GHz</p> <p>Start Freq 5.58650000 GHz</p> <p>Stop Freq 5.61350000 GHz</p> <p>CF Step 2.70000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
5700MHz	 <p>Agilent R T</p> <p>Ch Freq 5.7 GHz Trig Free</p> <p>Channel Power</p> <p>Center 5.70000000 GHz</p> <p>Ref 20.5 dBm #Atten 30 dB</p> <p>#Avg Log 10 dB/ Offst 0.5 dB</p> <p>Center 5.7 GHz Span 27 MHz</p> <p>#Res BW 100 kHz #VBW 1 MHz Sweep 8 ms (401 pts)</p> <p>Channel Power Power Spectral Density</p> <p>6.57 dBm / 18.0000 MHz -65.99 dBm/Hz</p> <p>Freq/Channel</p> <p>Center Freq 5.70000000 GHz</p> <p>Start Freq 5.68650000 GHz</p> <p>Stop Freq 5.71350000 GHz</p> <p>CF Step 2.70000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>

Mode:	802.11n-HT40
5510MHz	
5590MHz	
5670MHz	

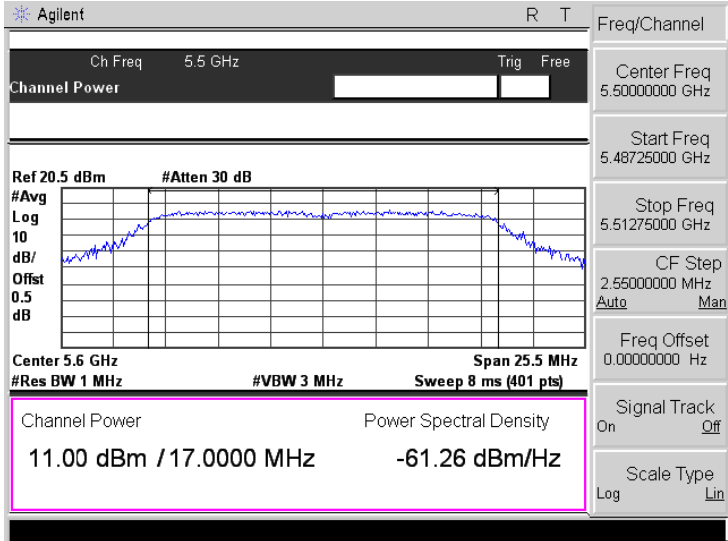
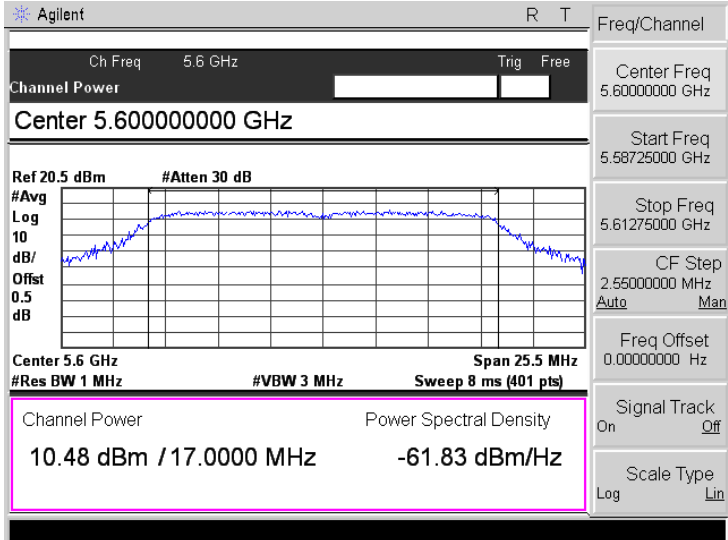
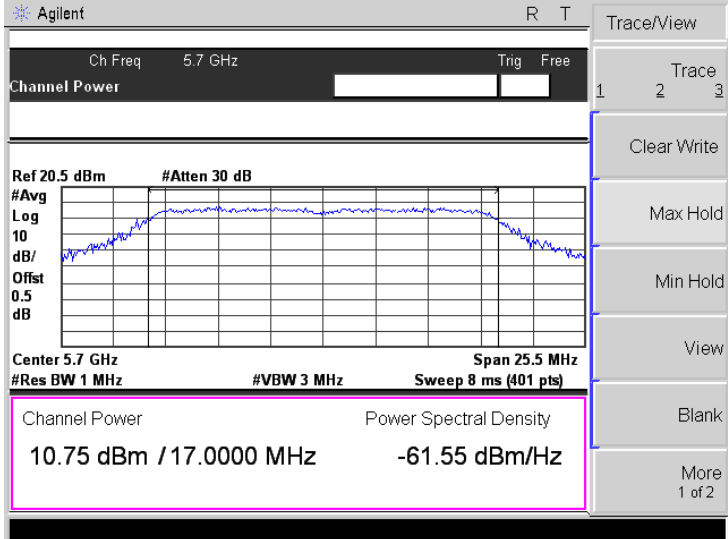
➤ Antenna 2: 5250-5350MHz

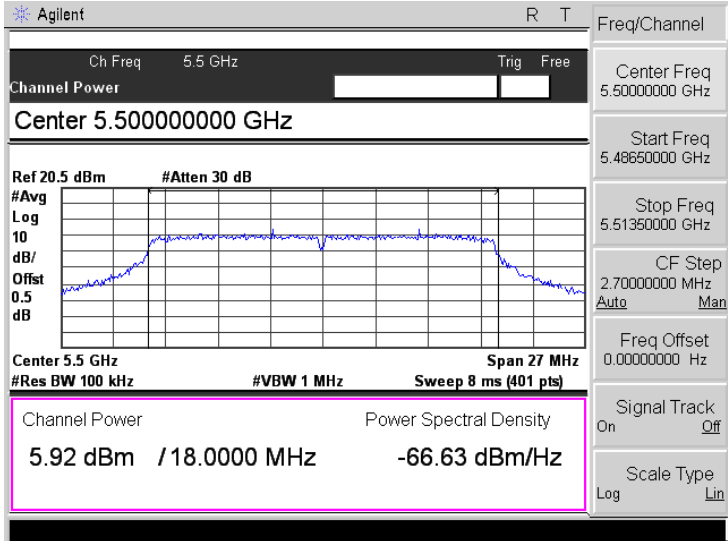
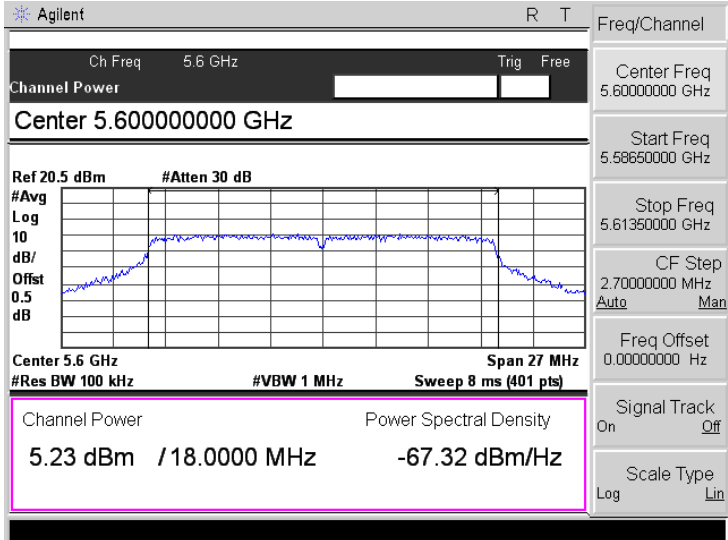
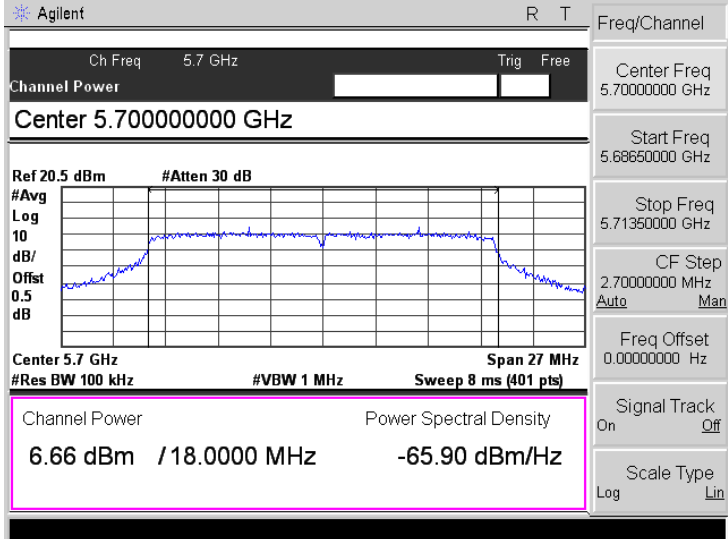
Mode:	802.11a
5260MHz	
5280MHz	
5320MHz	

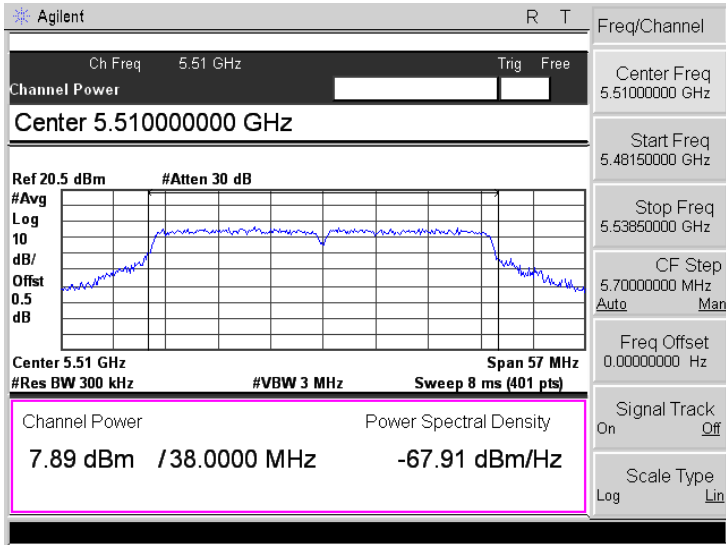
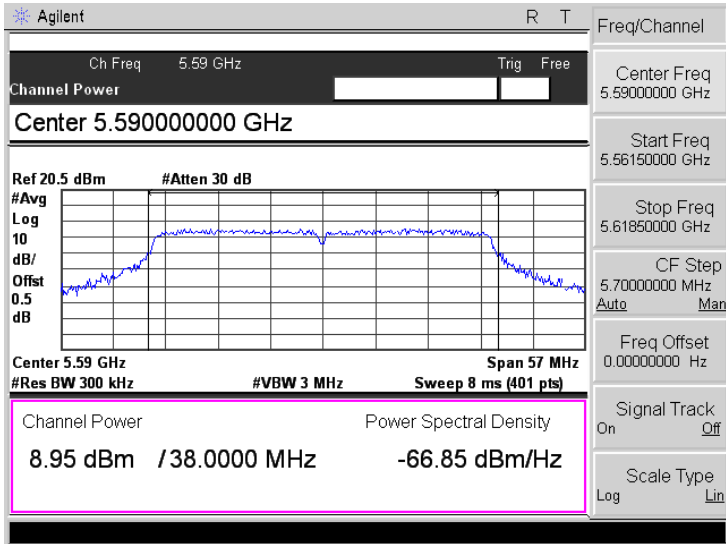
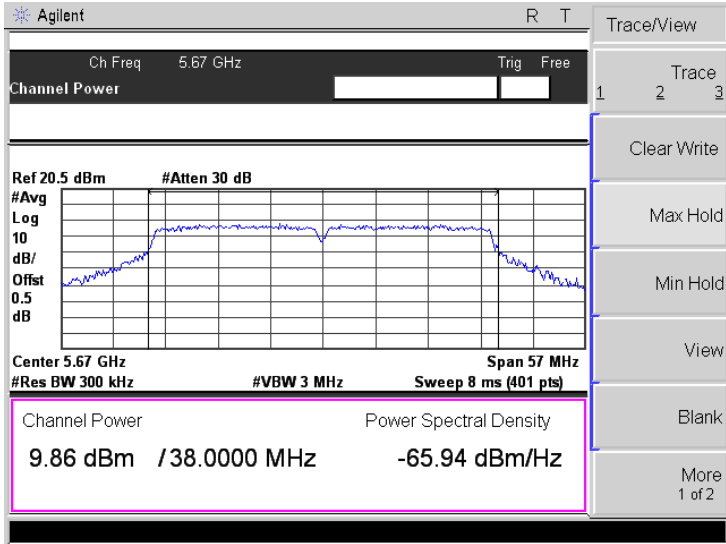
Mode:	802.11n-HT20
5260MHz	
5280MHz	
5320MHz	

Mode:	802.11n-HT40
5270MHz	
5310MHz	

➤ Antenna 2: 5470-5725MHz

Mode:	802.11a
5500MHz	
5600MHz	
5700MHz	

Mode:	802.11n-HT20
5500MHz	
5600MHz	
5700MHz	

Mode:	802.11n-HT40
5510MHz	
5590MHz	
5670MHz	

9. Radiated Spurious Emissions

9.1 Standard Applicable

According to §15.407(b), undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
 - (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

According to §15.407(b)(6), Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

According to §15.407(b)(7), The provisions of §15.205 apply to intentional radiators operating under this section.
789033 D02 v02r01 General UNII Test Procedures New Rules v01

If radiated measurements are performed, field strength is then converted to EIRP as follows:

$$\text{EIRP} = ((E \cdot d)^2) / 30$$

where:

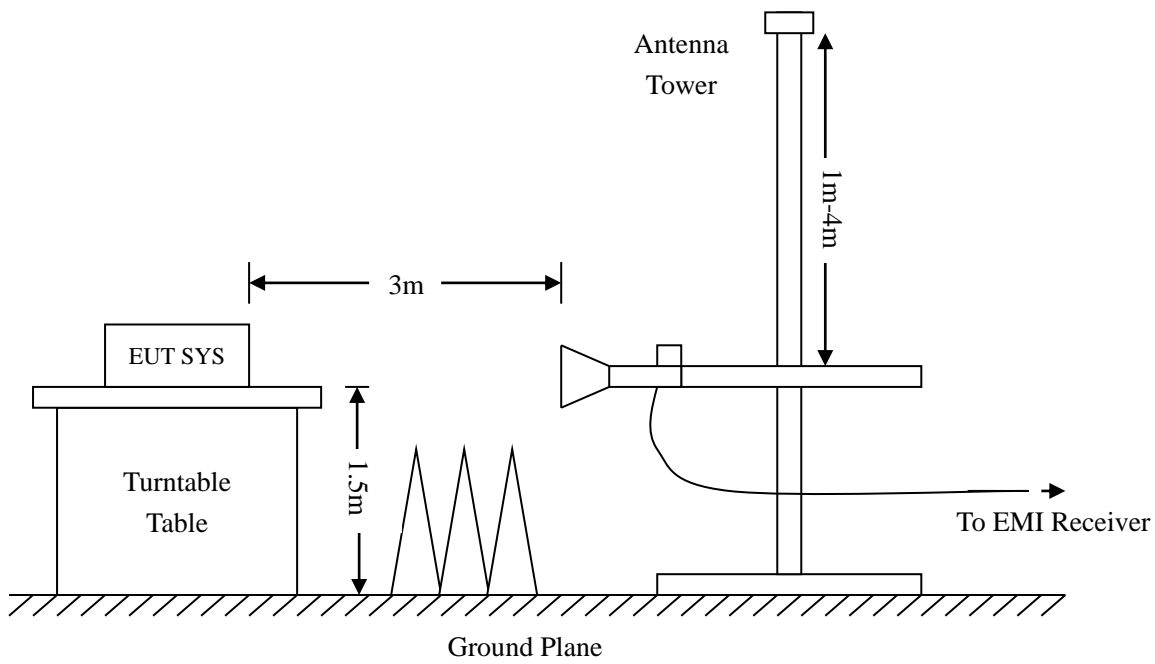
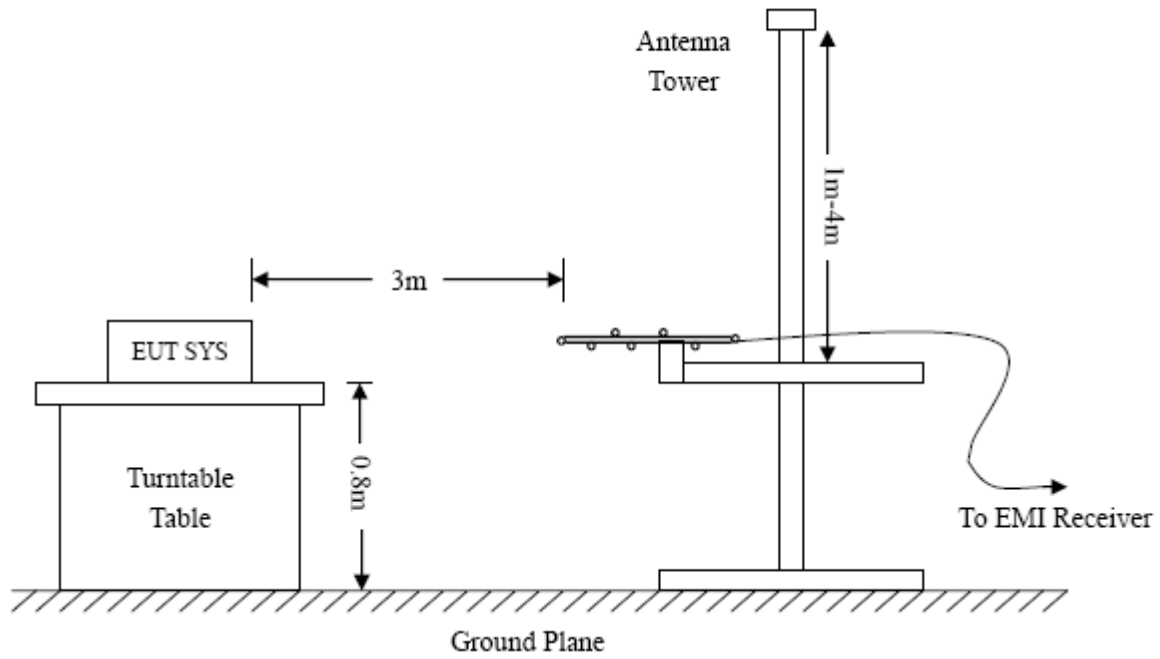
- E is the field strength in V/m;
- d is the measurement distance in meters;
- EIRP is the equivalent isotropically radiated power in watts.

9.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.407(b)(6) and FCC Part 15.209 Limit..

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.



9.3 Test Receiver Setup

During the radiated emission test for above 1GHz, the test receiver was set with the following configurations:

For peak detector:

RBW = 1000kHz, VBW = 3000kHz, Sweep Time = Auto

For average detector:

RBW = 1000kHz, VBW = 10Hz, Sweep Time = Auto

9.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB μ V means the emission is 6dB μ V below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

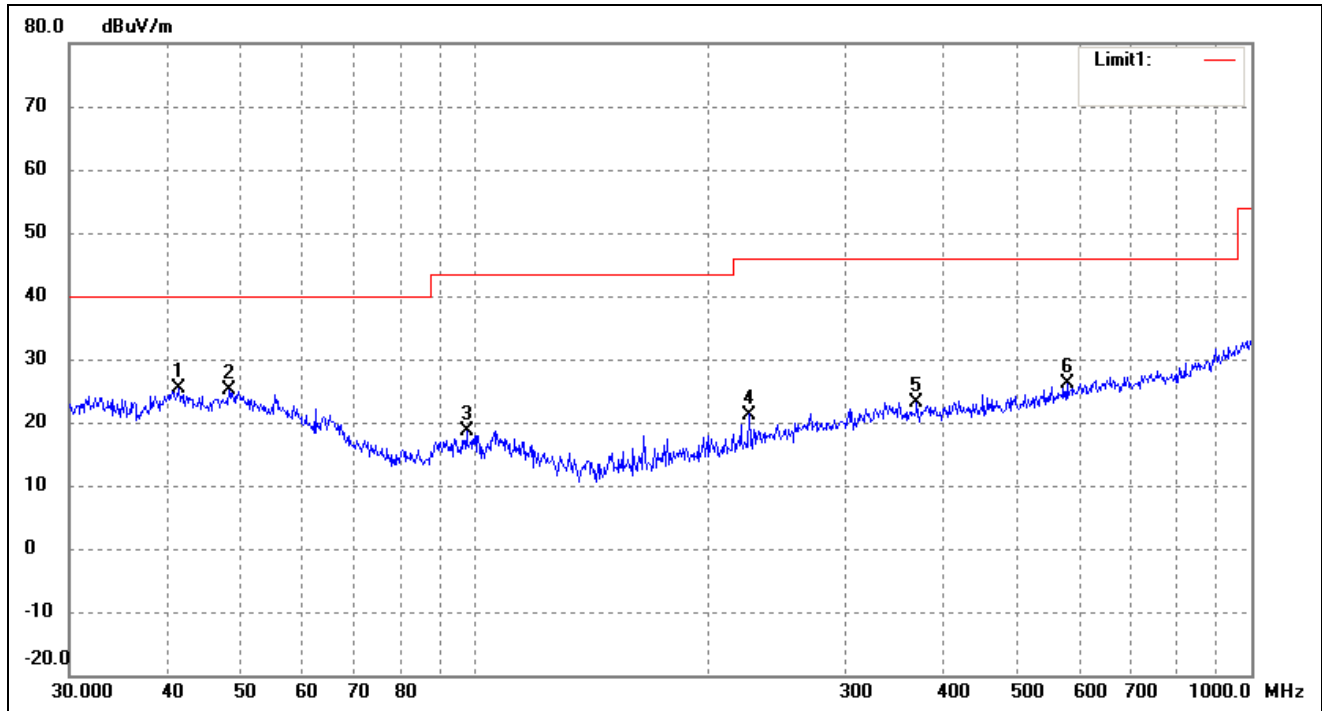
9.5 Summary of Test Results/Plots

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

➤ Spurious Emission From 30 MHz to 1 GHz (worst case Antenna 1)

➤ 5250-5350MHz

802.11a			
Test Channel	5260MHz	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	41.5670	33.44	-8.14	25.30	40.00	-14.70	72	100	peak
2	48.1626	33.41	-8.20	25.21	40.00	-14.79	179	100	peak
3	97.4560	33.69	-15.01	18.68	43.50	-24.82	147	100	peak
4	225.3080	33.61	-12.36	21.25	46.00	-24.75	142	100	peak
5	370.7023	31.40	-8.29	23.11	46.00	-22.89	178	100	peak
6	578.6699	30.62	-4.45	26.17	46.00	-19.83	116	100	peak

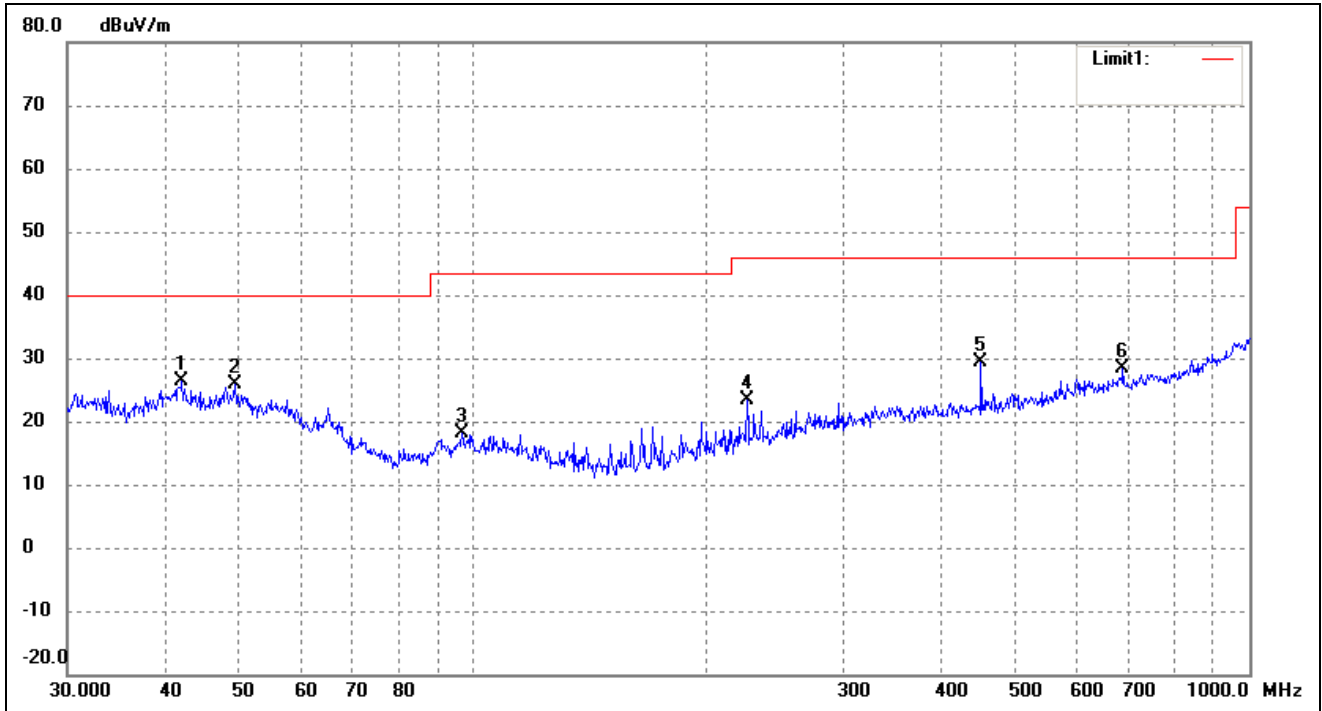
802.11a

Test Channel

5260MHz(worst case)

Polarity:

Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	42.1542	34.34	-8.02	26.32	40.00	-13.68	241	100	peak
2	49.3594	34.37	-8.42	25.95	40.00	-14.05	99	100	peak
3	96.7749	33.09	-15.04	18.05	43.50	-25.45	305	100	peak
4	225.3080	35.66	-12.36	23.30	46.00	-22.70	99	100	peak
5	451.1350	36.28	-6.94	29.34	46.00	-16.66	87	100	peak
6	687.1507	31.06	-2.79	28.27	46.00	-17.73	258	100	peak

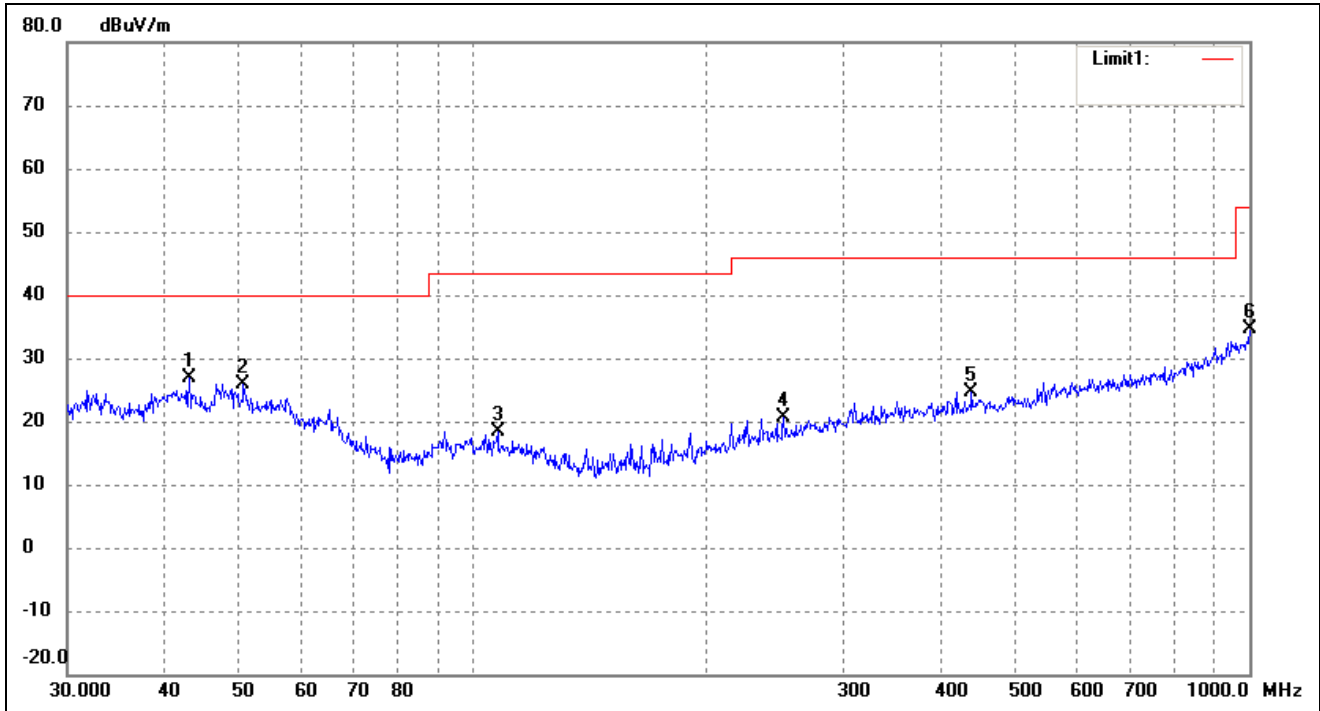
802.11n-HT20

Test Channel

5260MHz(worst case)

Polarity:

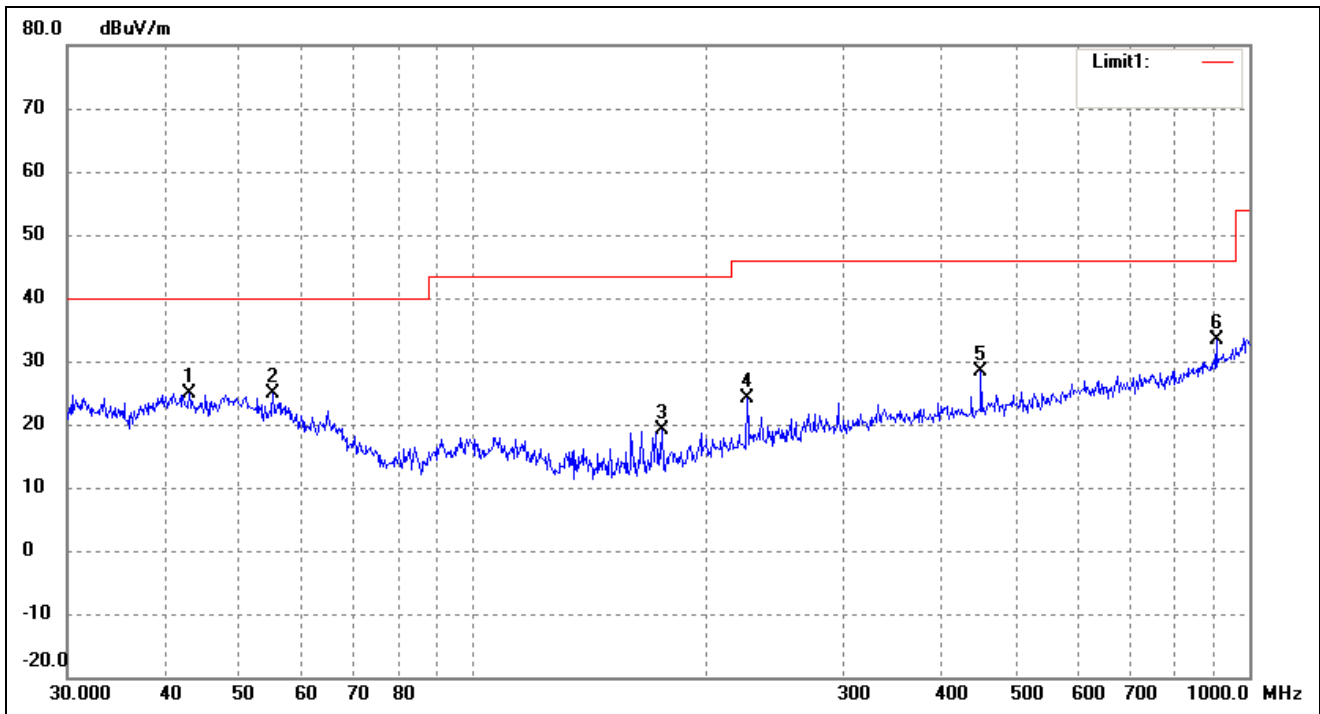
Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	43.0505	34.88	-8.01	26.87	40.00	-13.13	258	100	peak
2	50.5860	34.48	-8.55	25.93	40.00	-14.07	93	100	peak
3	107.5101	32.85	-14.46	18.39	43.50	-25.11	53	100	peak
4	251.1804	31.95	-11.23	20.72	46.00	-25.28	245	100	peak
5	438.6554	31.68	-6.95	24.73	46.00	-21.27	194	100	peak
6	1000.0000	30.60	4.04	34.64	54.00	-19.36	224	100	peak

802.11n-HT20

Test Channel	5260MHz(worst case)	Polarity:	Vertical
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	43.0505	33.01	-8.01	25.00	40.00	-15.00	63	100	peak
2	55.2207	34.19	-9.34	24.85	40.00	-15.15	186	100	peak
3	175.0368	34.64	-15.62	19.02	43.50	-24.48	99	100	peak
4	225.3080	36.45	-12.36	24.09	46.00	-21.91	133	100	peak
5	451.1350	35.35	-6.94	28.41	46.00	-17.59	358	100	peak
6	906.4824	31.72	1.55	33.27	46.00	-12.73	129	100	peak

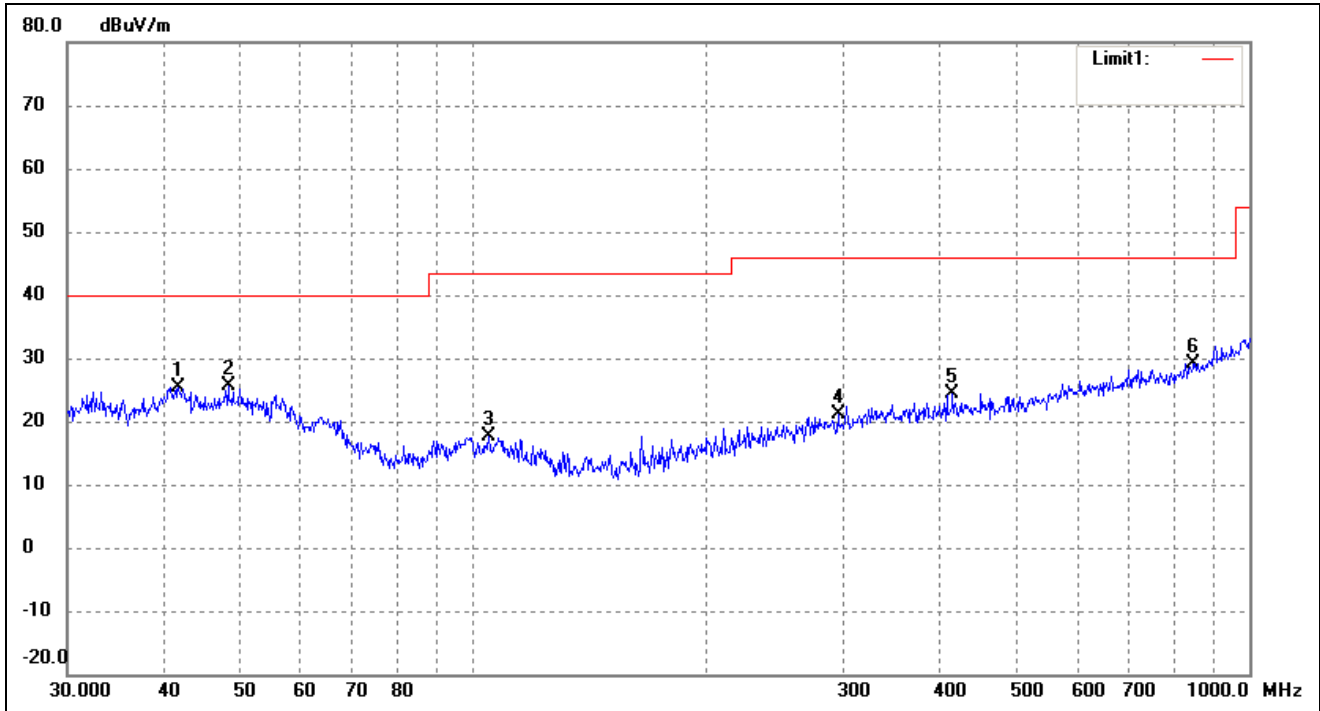
802.11n-HT40

Test Channel

5270MHz(worst case)

Polarity:

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	41.7130	33.52	-8.10	25.42	40.00	-14.58	232	100	peak
2	48.3318	33.92	-8.22	25.70	40.00	-14.30	99	100	peak
3	104.5361	32.29	-14.56	17.73	43.50	-25.77	318	100	peak
4	295.1469	30.59	-9.43	21.16	46.00	-24.84	110	100	peak
5	414.7223	31.40	-7.04	24.36	46.00	-21.64	338	100	peak
6	848.0563	29.51	-0.28	29.23	46.00	-16.77	221	100	peak

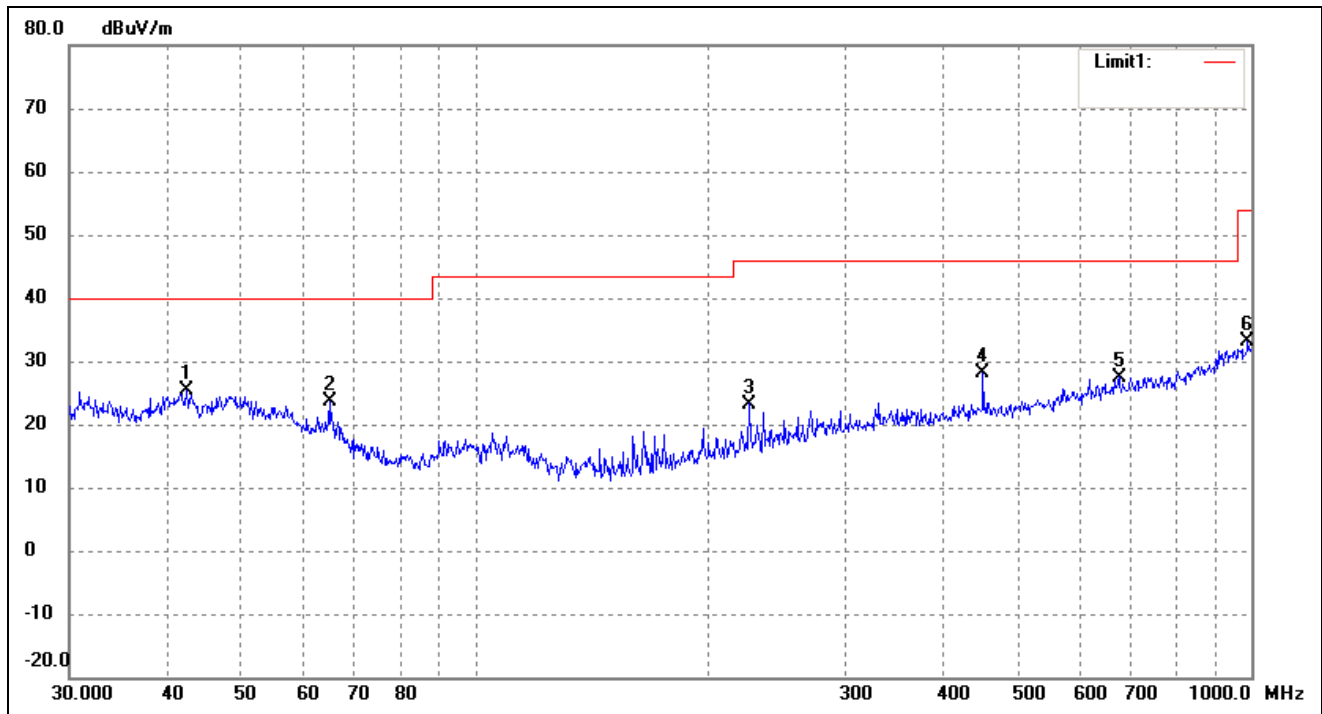
802.11n-HT40

Test Channel

5270MHz(worst case)

Polarity:

Vertical

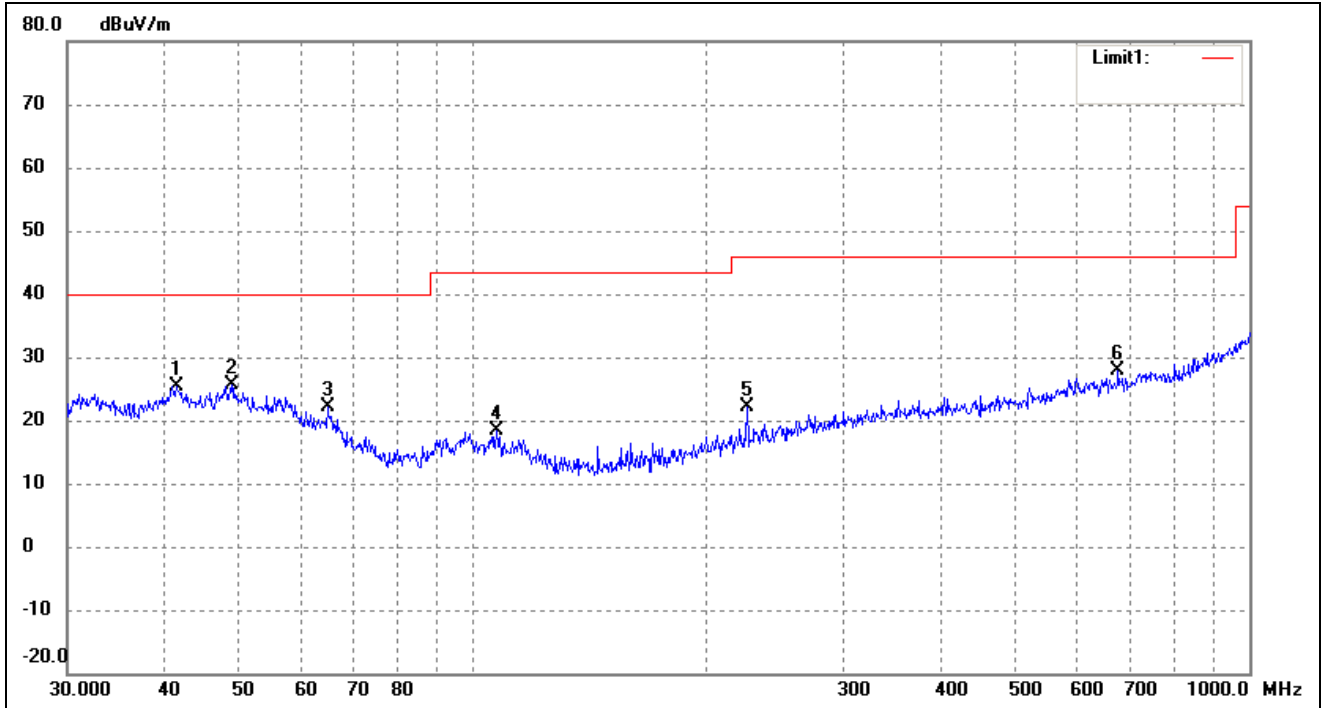


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	42.4508	33.32	-8.02	25.30	40.00	-14.70	204	100	peak
2	64.8865	35.68	-12.13	23.55	40.00	-16.45	108	100	peak
3	225.3080	35.61	-12.36	23.25	46.00	-22.75	84	100	peak
4	451.1350	35.06	-6.94	28.12	46.00	-17.88	95	100	peak
5	675.2080	30.53	-3.03	27.50	46.00	-18.50	88	100	peak
6	989.5355	29.36	3.88	33.24	54.00	-20.76	281	100	peak

➤ 5470-5725MHz

802.11a

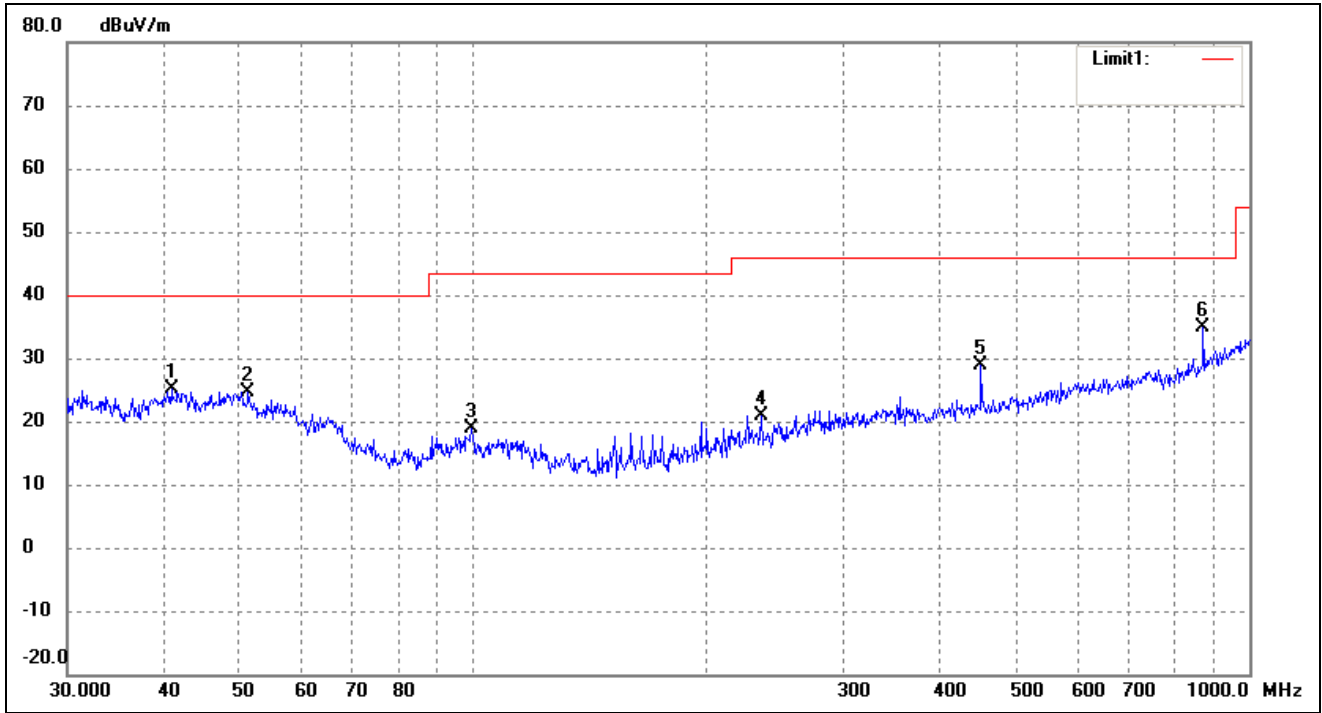
Test Channel	5500MHz(worst case)	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	41.4215	33.62	-8.18	25.44	40.00	-14.56	28	100	peak
2	48.8429	33.96	-8.32	25.64	40.00	-14.36	186	100	peak
3	64.8865	34.33	-12.13	22.20	40.00	-17.80	99	100	peak
4	107.1337	32.94	-14.48	18.46	43.50	-25.04	93	100	peak
5	225.3080	34.49	-12.36	22.13	46.00	-23.87	191	100	peak
6	677.5798	30.73	-2.97	27.76	46.00	-18.24	315	100	peak

802.11a

Test Channel	5500MHz(worst case)	Polarity:	Vertical
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	40.8446	33.37	-8.33	25.04	40.00	-14.96	351	100	peak
2	51.3005	33.32	-8.57	24.75	40.00	-15.25	98	100	peak
3	99.5281	33.77	-14.94	18.83	43.50	-24.67	116	100	peak
4	234.9909	32.72	-11.85	20.87	46.00	-25.13	90	100	peak
5	451.1350	35.92	-6.94	28.98	46.00	-17.02	234	100	peak
6	872.1832	34.44	0.48	34.92	46.00	-11.08	257	100	peak

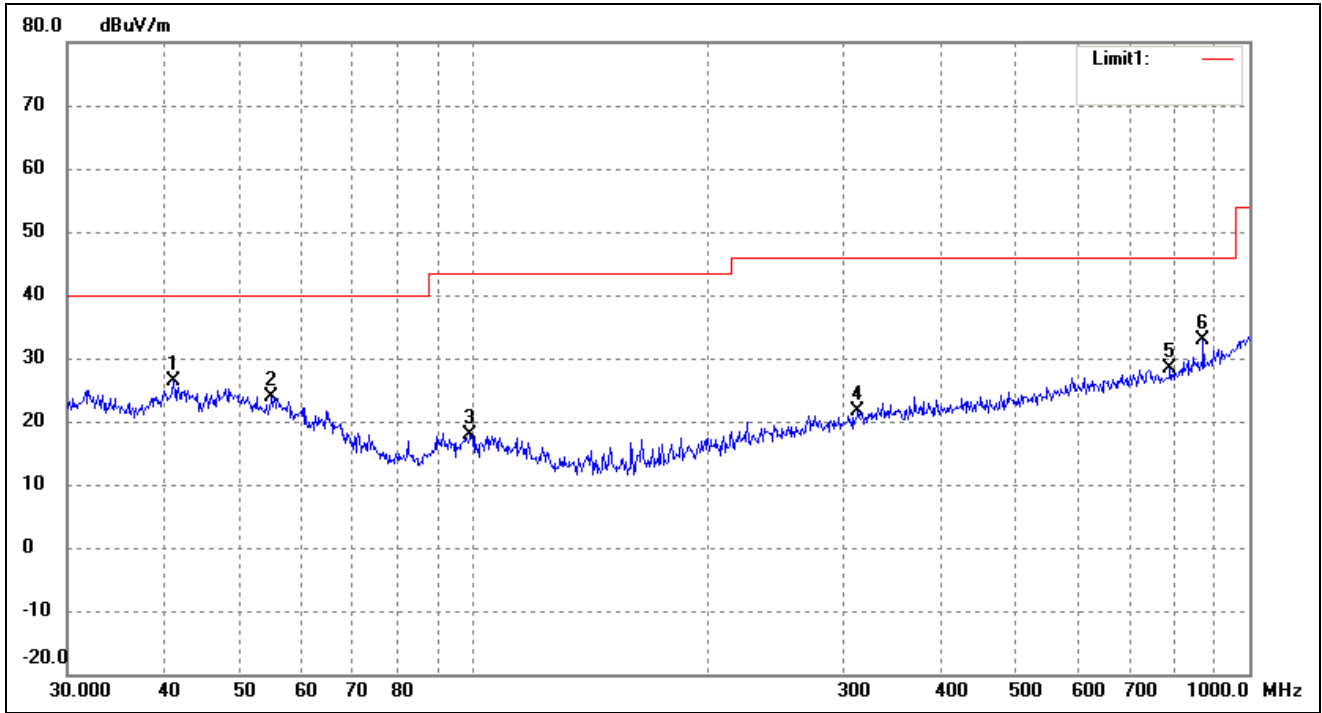
802.11n-HT20

Test Channel

5500MHz(worst case)

Polarity:

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	41.1320	34.60	-8.25	26.35	40.00	-13.65	310	100	peak
2	55.0274	33.25	-9.27	23.98	40.00	-16.02	193	100	peak
3	99.1797	32.83	-14.95	17.88	43.50	-25.62	63	100	peak
4	313.2760	30.51	-9.00	21.51	46.00	-24.49	144	100	peak
5	790.6188	30.05	-1.72	28.33	46.00	-17.67	53	100	peak
6	872.1832	32.37	0.48	32.85	46.00	-13.15	131	100	peak

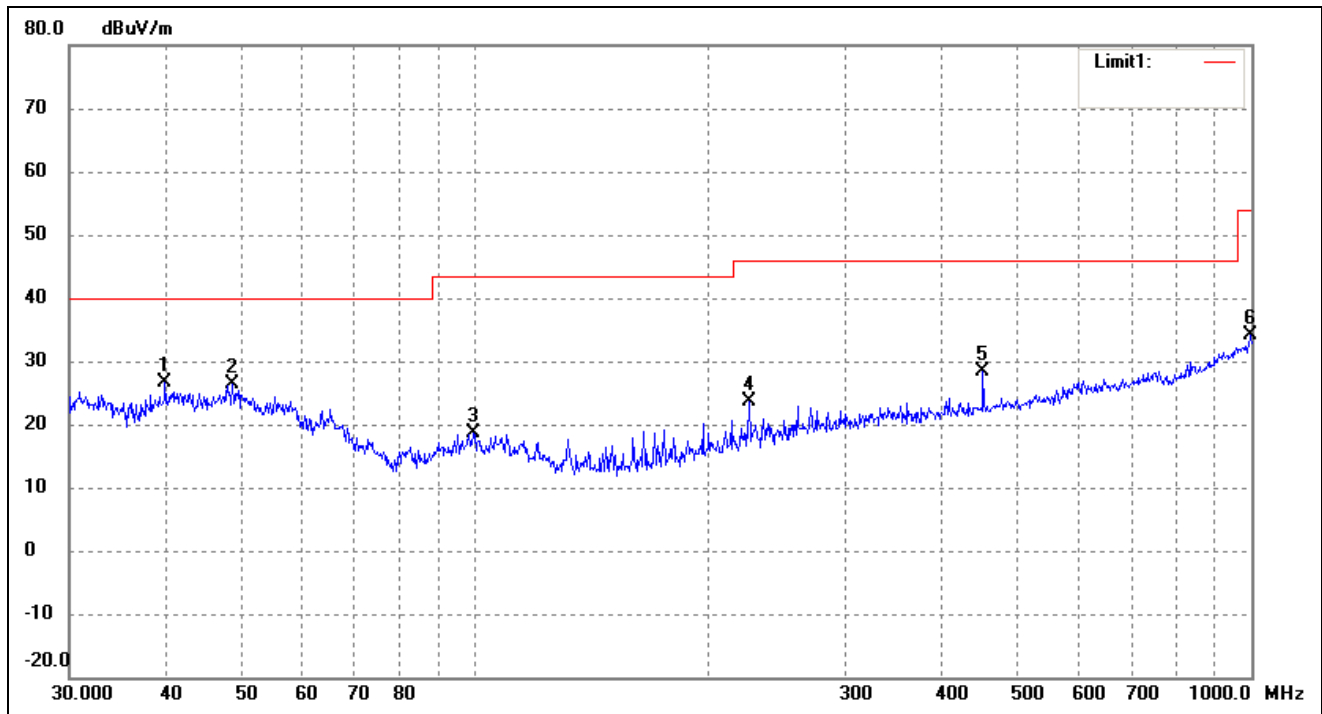
802.11n-HT20

Test Channel

5500MHz(worst case)

Polarity:

Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	39.8542	35.21	-8.56	26.65	40.00	-13.35	87	100	peak
2	48.6719	34.58	-8.29	26.29	40.00	-13.71	123	100	peak
3	99.5281	33.60	-14.94	18.66	43.50	-24.84	60	100	peak
4	225.3080	35.98	-12.36	23.62	46.00	-22.38	137	100	peak
5	451.1350	35.27	-6.94	28.33	46.00	-17.67	170	100	peak
6	996.4996	30.24	3.98	34.22	54.00	-19.78	276	100	peak

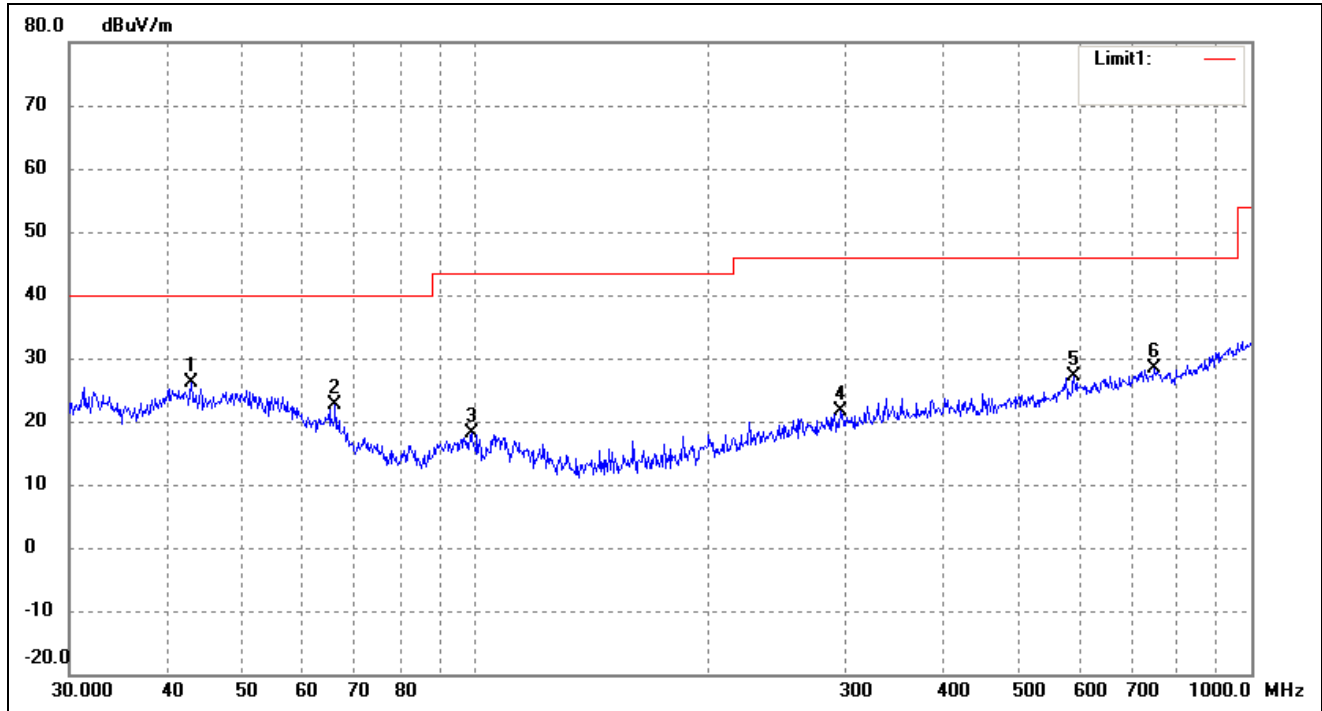
802.11n-HT40

Test Channel

5510MHz(worst case)

Polarity:

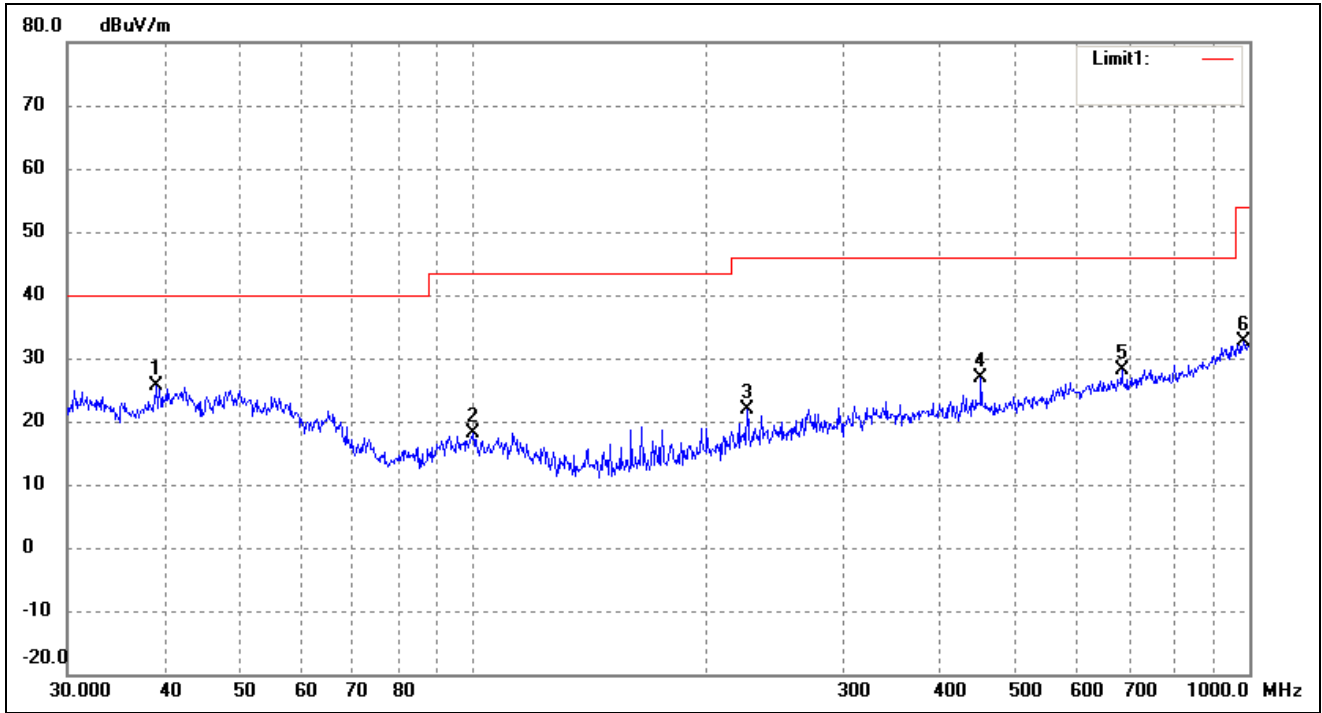
Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	43.0505	34.15	-8.01	26.14	40.00	-13.86	81	100	peak
2	66.0342	35.39	-12.64	22.75	40.00	-17.25	201	100	peak
3	98.8326	33.02	-14.96	18.06	43.50	-25.44	57	100	peak
4	295.1469	31.18	-9.43	21.75	46.00	-24.25	184	100	peak
5	590.9737	31.13	-3.99	27.14	46.00	-18.86	119	100	peak
6	750.1083	30.20	-1.75	28.45	46.00	-17.55	192	100	peak

802.11n-HT40

Test Channel	5510MHz(worst case)	Polarity:	Vertical
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	39.0245	34.39	-8.66	25.73	40.00	-14.27	272	100	peak
2	99.8777	33.15	-14.92	18.23	43.50	-25.27	97	100	peak
3	225.3080	34.31	-12.36	21.95	46.00	-24.05	186	100	peak
4	451.1350	33.87	-6.94	26.93	46.00	-19.07	95	100	peak
5	684.7454	30.96	-2.83	28.13	46.00	-17.87	210	100	peak
6	982.6200	28.79	3.77	32.56	54.00	-21.44	341	100	peak

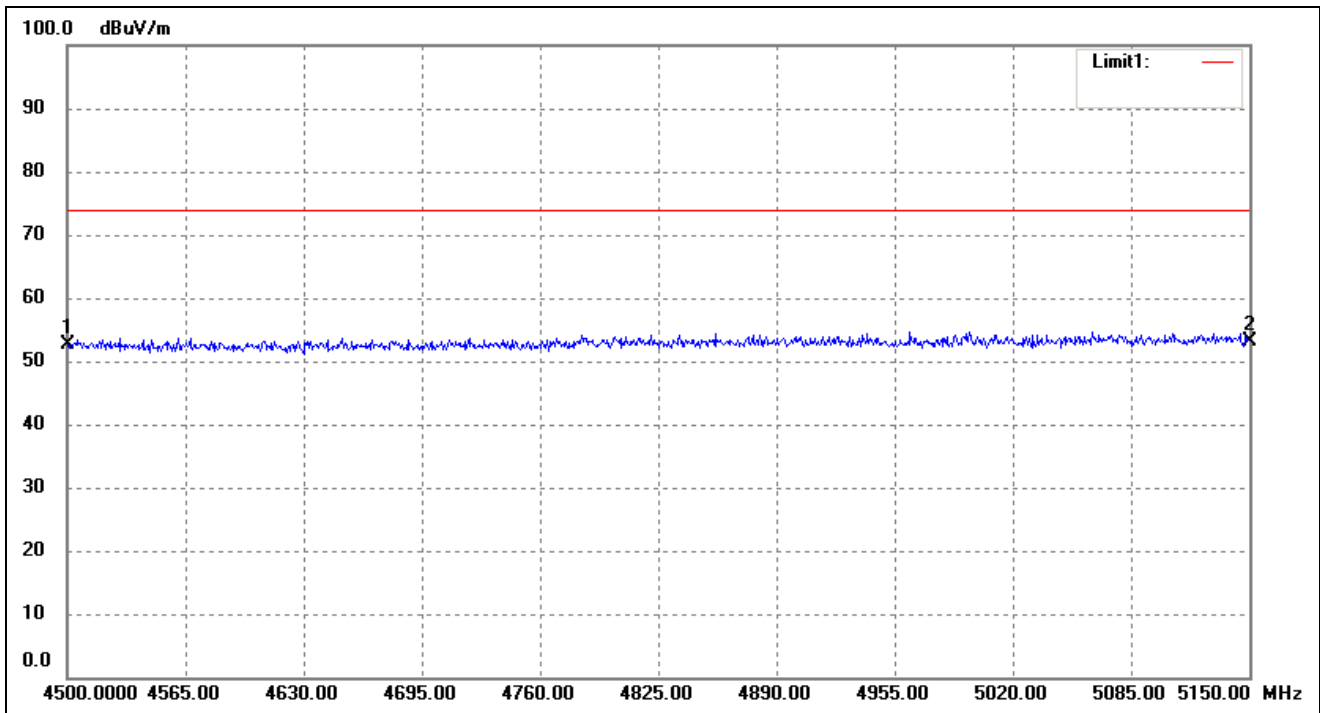
➤ Spurious Emission above 1GHz

➤ Antenna 1

Band2:

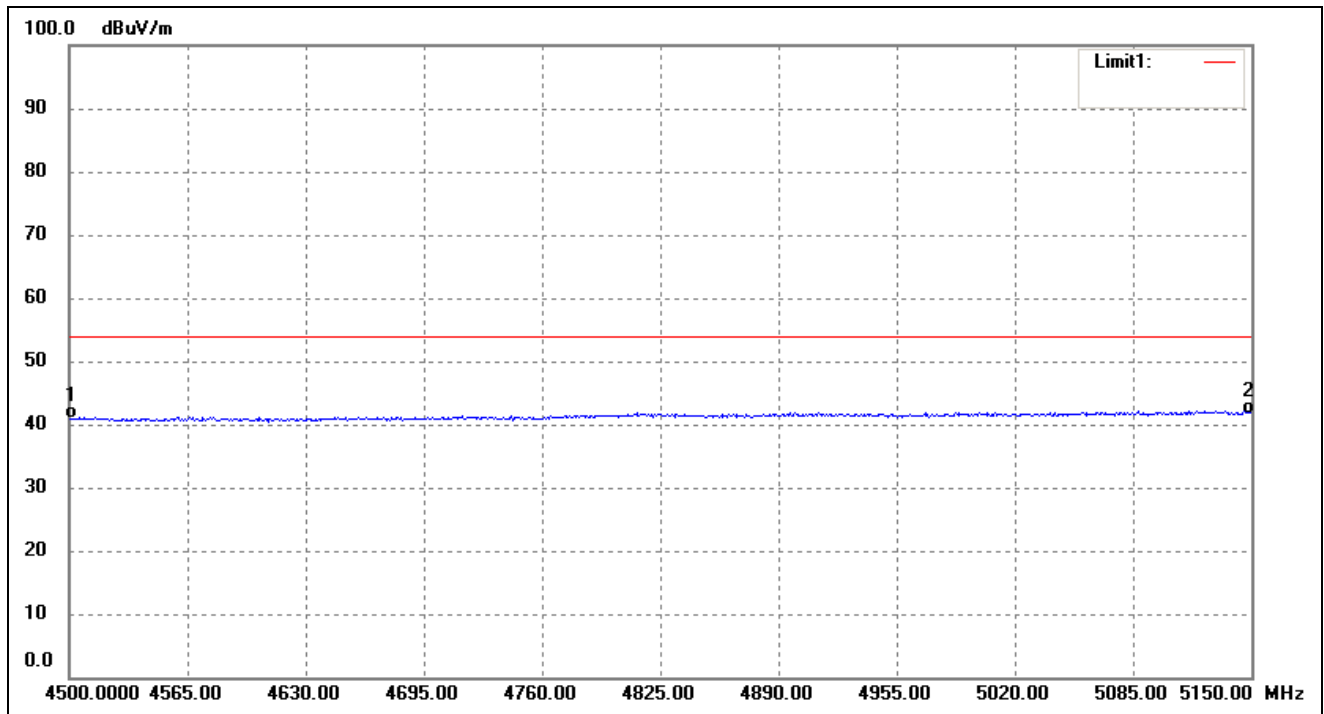
802.11a- Restricted Bandedge (worst case)

Test Channel	band 4.5-5.15GHz	Polarity:	Vertical(worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	4500.000	53.39	-0.65	52.74	74.00	-21.26	107	100	peak
2	5150.000	52.51	0.69	53.20	74.00	-20.80	55	100	peak

802.11a- Restricted Bandedge (worst case)			
Test Channel	band 4.5-5.15GHz	Polarity:	Vertical(worst case)

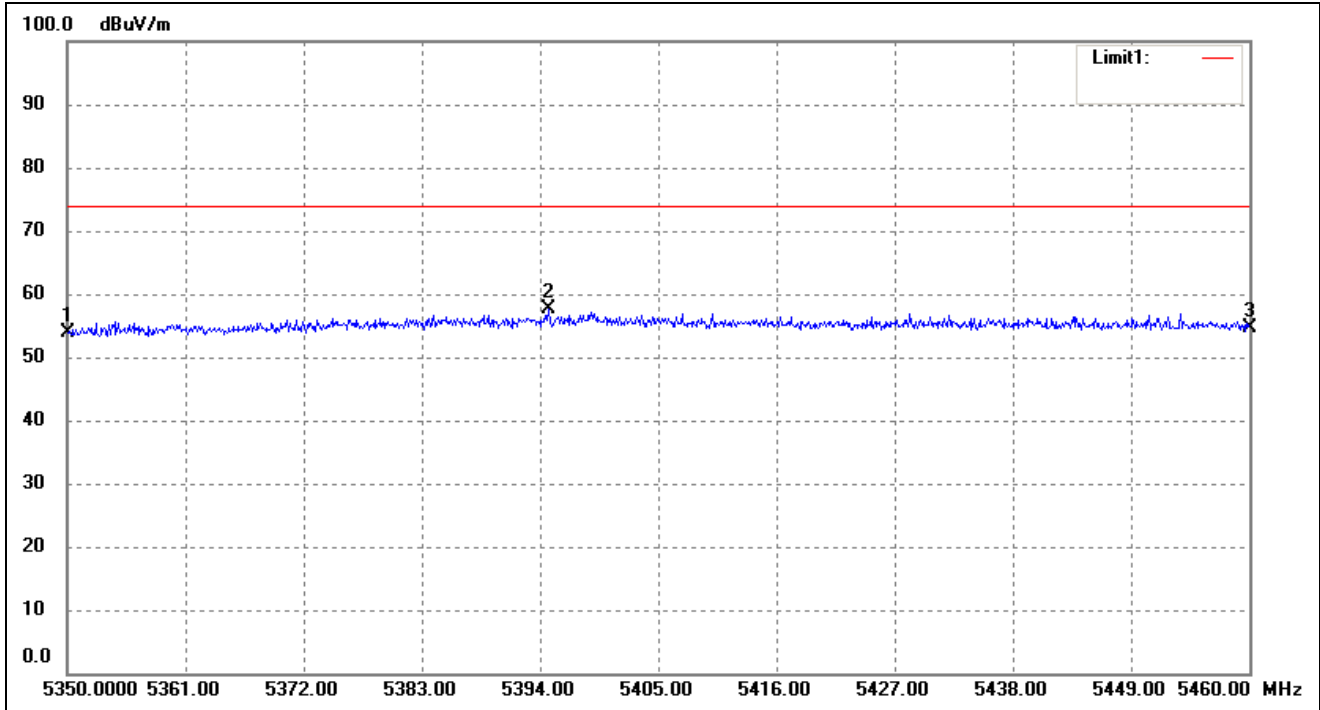


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	4500.000	41.46	-0.65	40.81	54.00	-13.19	304	100	AVG
2	5150.000	40.90	0.69	41.59	54.00	-12.41	92	100	AVG

Band2:

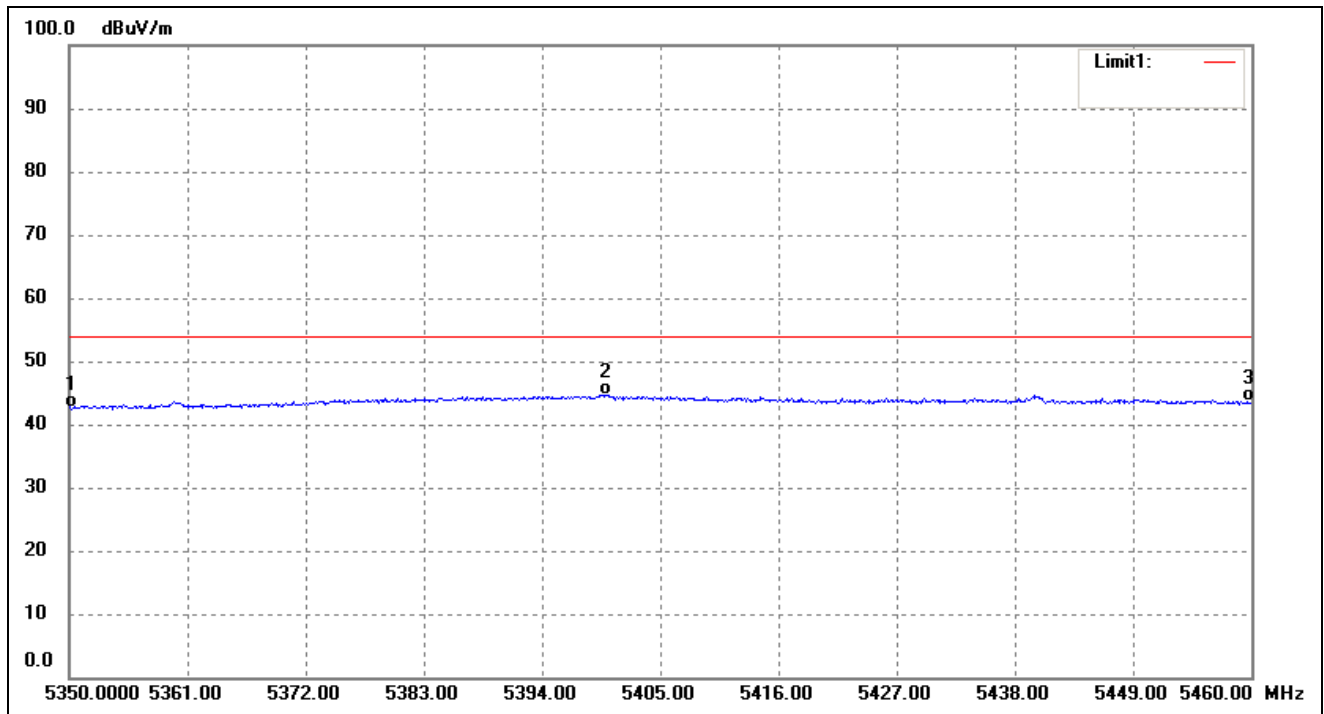
802.11a- Restricted Bandedge (worst case)

Test Channel	band 5.35-5.46GHz	Polarity:	Vertical(worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5350.000	52.62	1.19	53.81	74.00	-20.19	110	100	peak
2	5394.770	56.23	1.31	57.54	74.00	-16.46	91	100	peak
3	5460.000	53.05	1.47	54.52	74.00	-19.48	299	100	peak

802.11a- Restricted Bandedge (worst case)			
Test Channel	band 5.35-5.46GHz	Polarity:	Vertical(worst case)

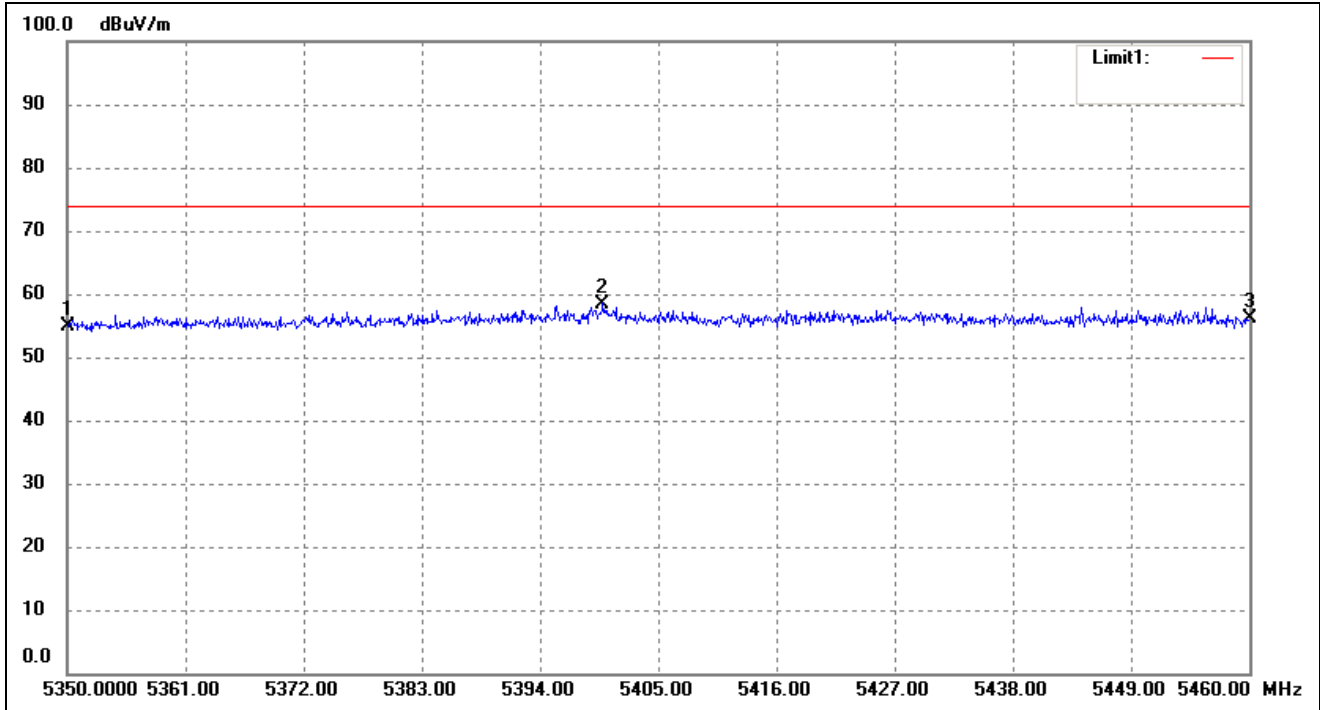


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5350.000	41.32	1.19	42.51	54.00	-11.49	55	100	AVG
2	5399.940	43.37	1.32	44.69	54.00	-9.31	184	100	AVG
3	5460.000	42.04	1.47	43.51	54.00	-10.49	102	100	AVG

Band3:

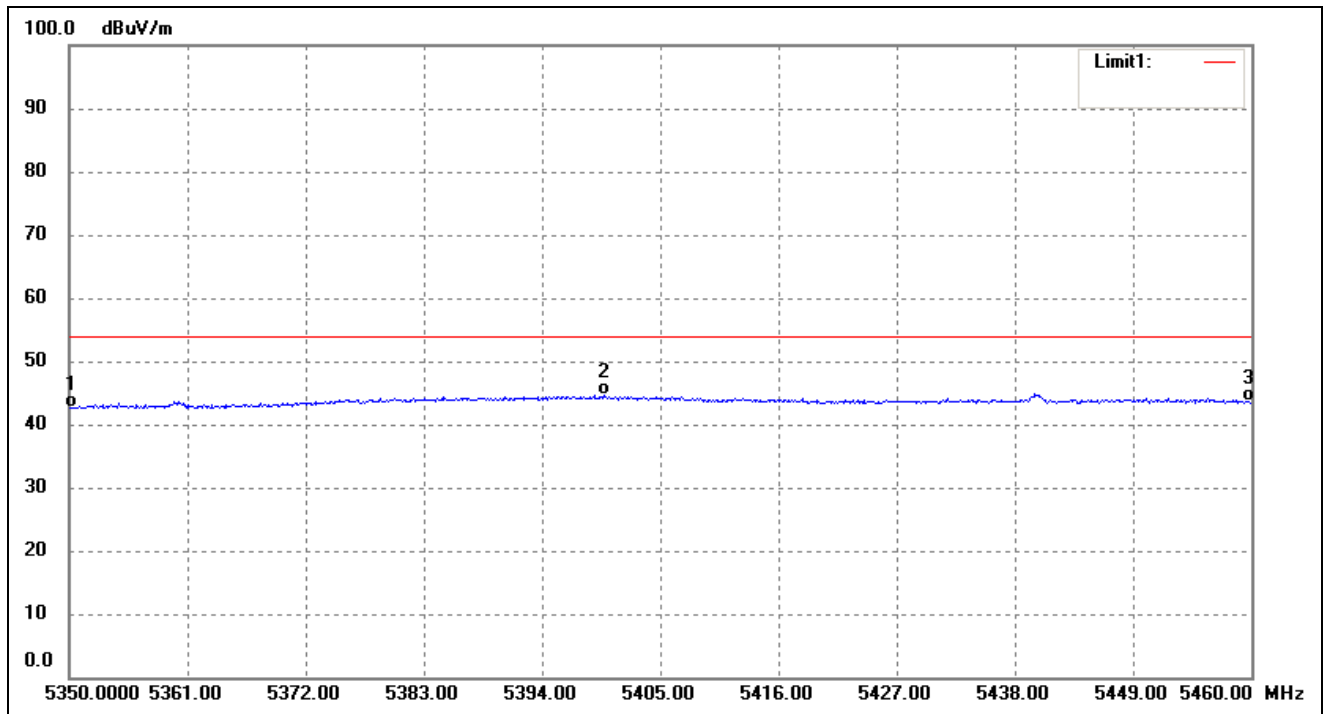
802.11a- Restricted Bandedge (worst case)

Test Channel	band 5.35-5.46GHz	Polarity:	Vertical(worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5350.000	53.81	1.19	55.00	74.00	-19.00	319	100	peak
2	5399.830	57.18	1.32	58.50	74.00	-15.50	260	100	peak
3	5460.000	54.68	1.47	56.15	74.00	-17.85	100	100	peak

802.11a- Restricted Bandedge (worst case)			
Test Channel	band 5.35-5.46GHz	Polarity:	Vertical(worst case)

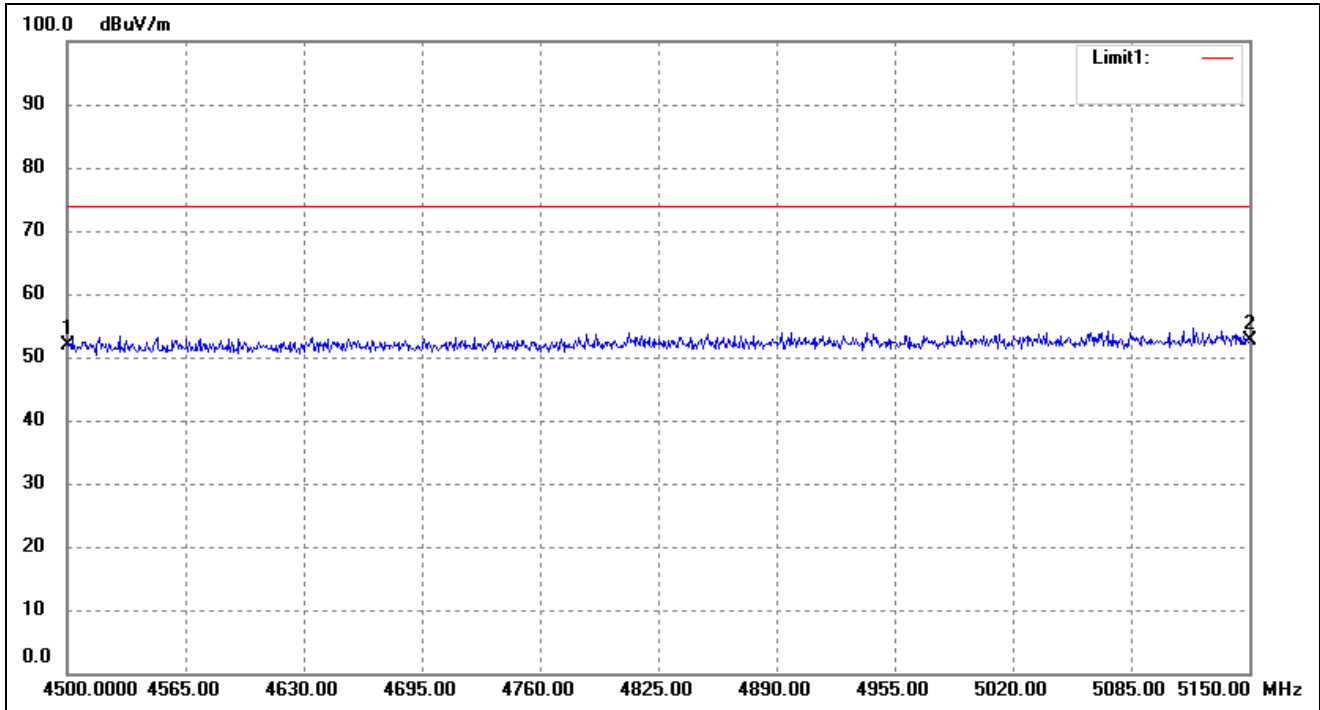


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5350.000	41.48	1.19	42.67	54.00	-11.33	184	100	AVG
2	5399.720	43.21	1.32	44.53	54.00	-9.47	102	100	AVG
3	5460.000	42.16	1.47	43.63	54.00	-10.37	109	100	AVG

➤ Antenna 2

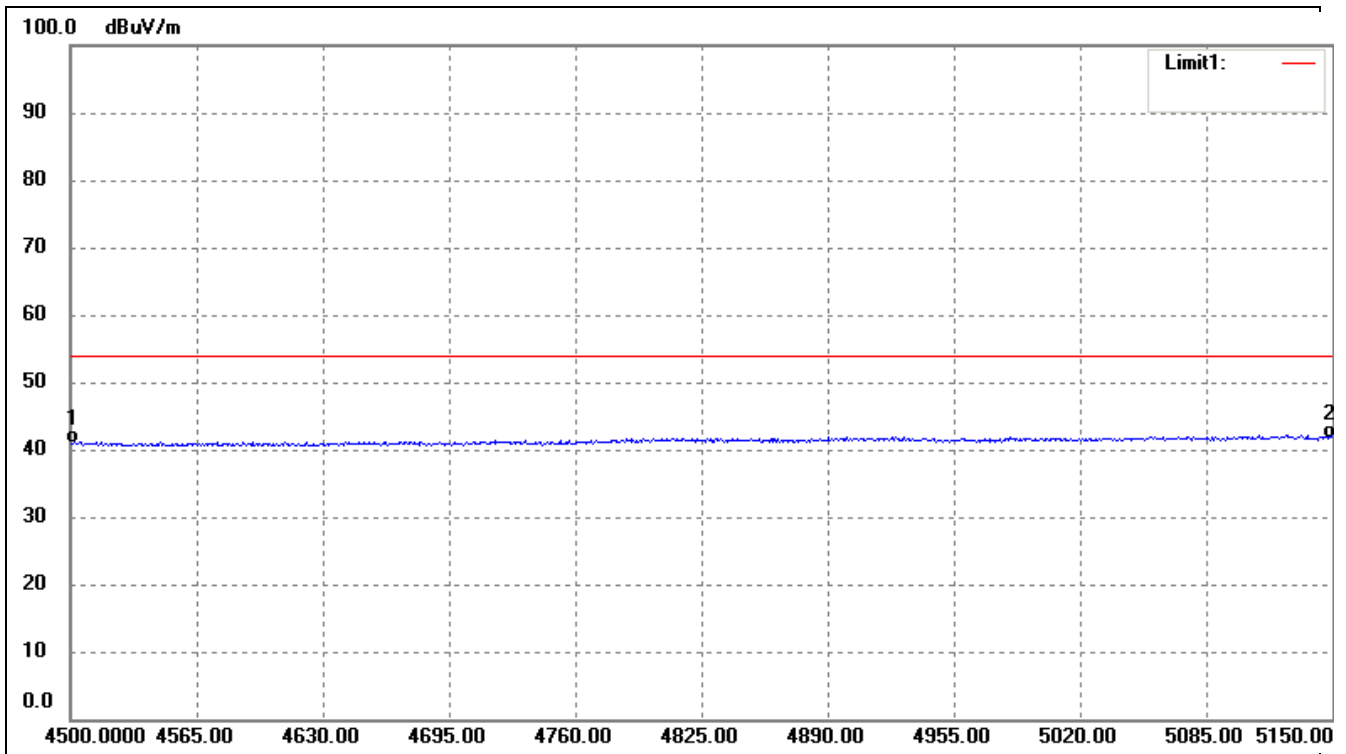
Band2:

802.11a- Restricted Bandedge (worst case)			
Test Channel	band 4.5-5.15GHz	Polarity:	Vertical(worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	4500.000	52.51	-0.65	51.86	74.00	-22.14	74	100	peak
2	5150.000	51.90	0.69	52.59	74.00	-21.41	153	100	peak

802.11a- Restricted Bandedge (worst case)			
Test Channel	band 4.5-5.15GHz	Polarity:	Vertical(worst case)

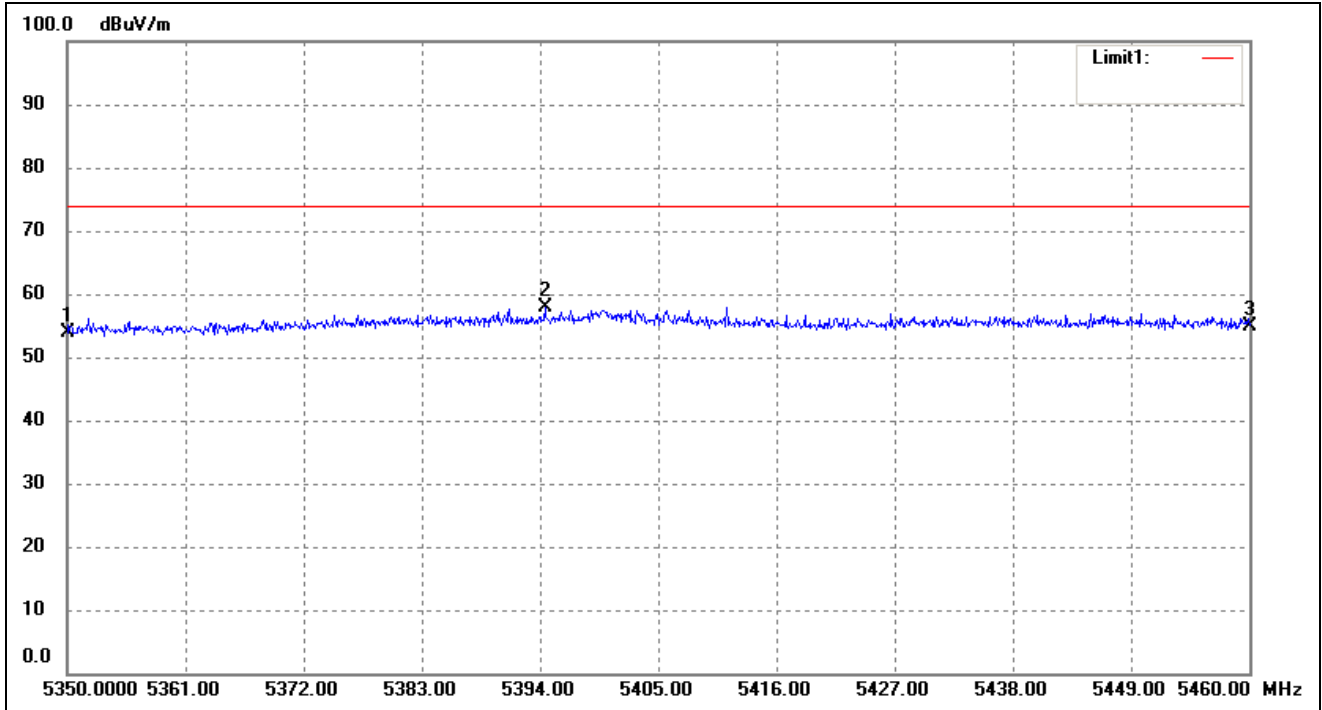


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	4500.000	41.63	-0.65	40.98	54.00	-13.02	339	100	AVG
2	5150.000	41.01	0.69	41.70	54.00	-12.30	157	100	AVG

Band2:

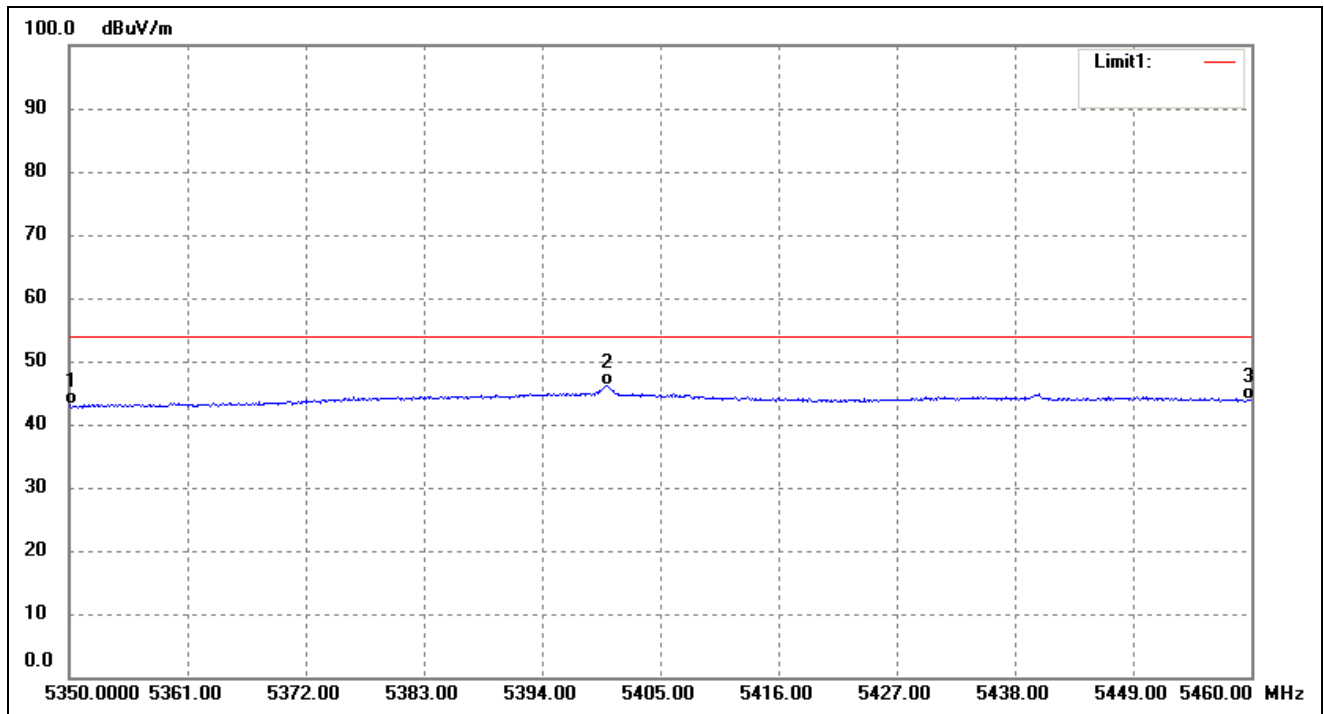
802.11a- Restricted Bandedge (worst case)

Test Channel	band 5.35-5.46GHz	Polarity:	Vertical(worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5350.000	52.78	1.19	53.97	74.00	-20.03	98	100	peak
2	5394.440	56.49	1.31	57.80	74.00	-16.20	171	100	peak
3	5460.000	53.48	1.47	54.95	74.00	-19.05	111	100	peak

802.11a- Restricted Bandedge (worst case)			
Test Channel	band 5.35-5.46GHz	Polarity:	Vertical(worst case)

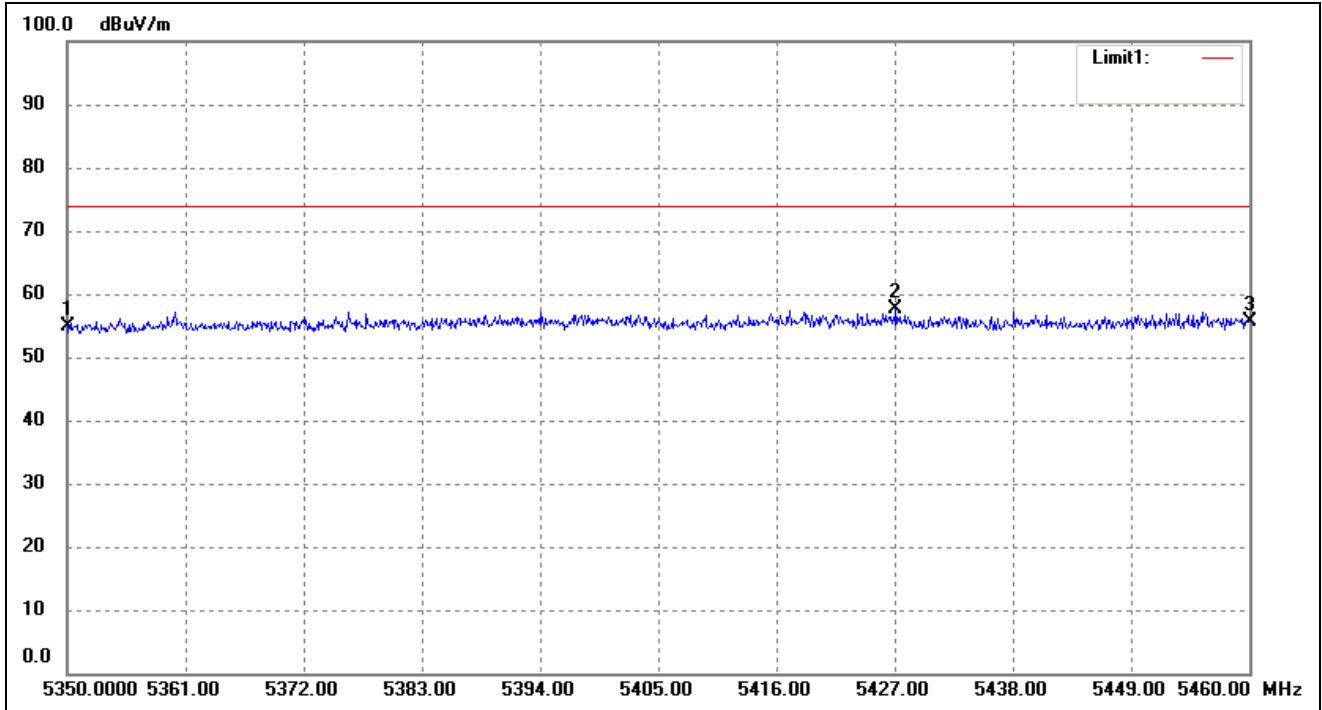


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5350.000	41.84	1.19	43.03	54.00	-10.97	143	100	AVG
2	5400.050	44.85	1.32	46.17	54.00	-7.83	50	100	AVG
3	5460.000	42.40	1.47	43.87	54.00	-10.13	132	100	AVG

Band3:

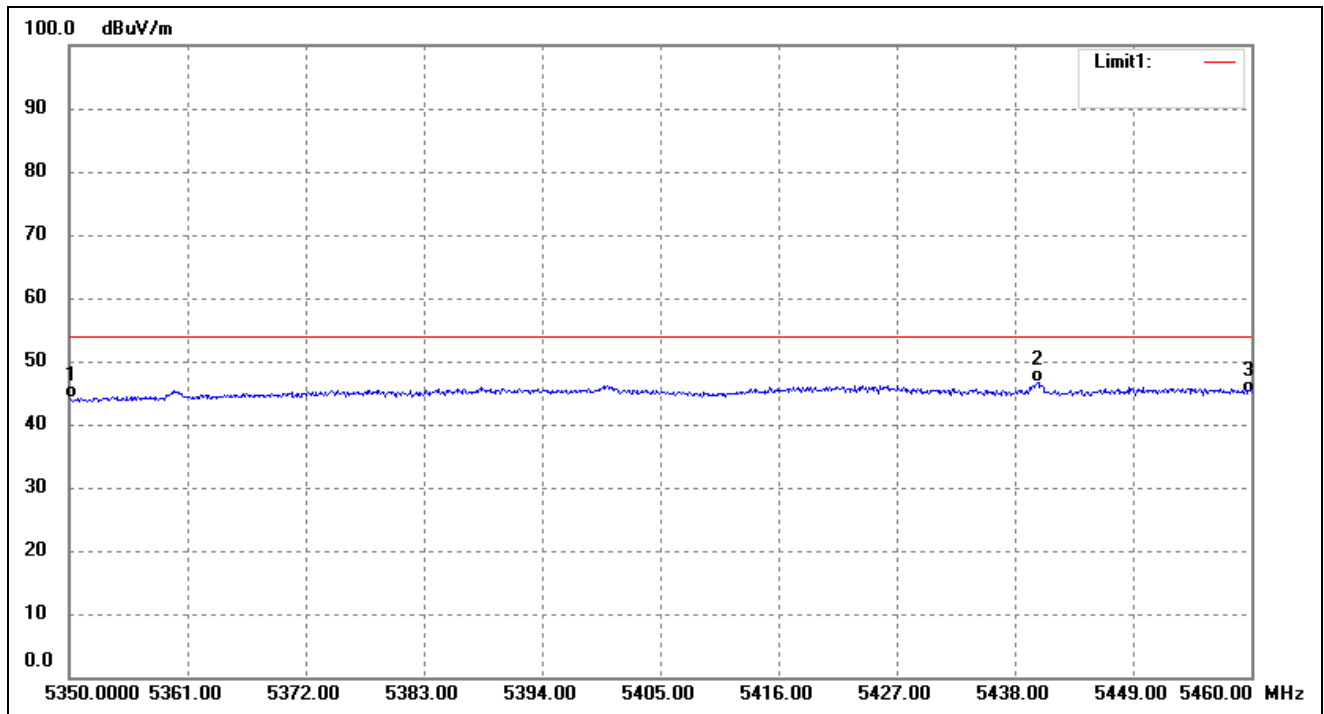
802.11a- Restricted Bandedge (worst case)

Test Channel	band 5.35-5.46GHz	Polarity:	Vertical(worst case)
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No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5350.000	53.71	1.19	54.90	74.00	-19.10	262	100	peak
2	5427.110	56.12	1.39	57.51	74.00	-16.49	226	100	peak
3	5460.000	54.19	1.47	55.66	74.00	-18.34	50	100	peak

802.11a- Restricted Bandedge (worst case)			
Test Channel	band 5.35-5.46GHz	Polarity:	Vertical(worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ()	Height (cm)	Remark
1	5350.000	42.94	1.19	44.13	54.00	-9.87	299	100	AVG
2	5440.090	45.19	1.42	46.61	54.00	-7.39	92	100	AVG
3	5460.000	43.36	1.47	44.83	54.00	-9.17	270	100	AVG

Note: The Restricted Bandedge was tested in Horizontal /Vertical and the worst case position data was reported.

- The worse mode Antenna 1
- For the frequency band 5.250-5.350GHz, 5.470-5.725GHz (802.11a)
- Harmonics And Spurious Emissions

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5260MHz)							
10520	49.72	7.12	56.84	74	-17.16	H	PK
10520	34.89	7.12	42.01	54	-11.99	H	AV
10520	51.52	7.12	58.64	74	-15.36	H	PK
10520	34.60	7.12	41.72	54	-12.28	H	AV
High Channel (5320MHz)							
10640	50.56	7.24	57.80	74	-16.20	H	PK
10640	30.84	7.24	38.08	54	-15.92	H	AV
10640	52.68	7.24	59.92	74	-14.08	H	PK
10640	30.21	7.24	37.45	54	-16.55	H	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5500MHz)							
11000	50.13	7.57	57.70	74	-16.30	H	PK
11000	33.10	7.57	40.67	54	-13.33	H	AV
11000	49.28	7.57	56.85	74	-17.15	H	PK
11000	33.77	7.57	41.34	54	-12.66	H	AV
High Channel (5700MHz)							
11400	49.23	8.75	57.98	74	-16.02	H	PK
11400	34.69	8.75	43.44	54	-10.56	H	AV
11400	49.12	8.75	57.87	74	-16.13	H	PK
11400	33.87	8.75	42.62	54	-11.38	H	AV

➤ Out of Band edge for 5250-5350MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-34.54	-27
Highest	Above 5350	-35.21	-27
Note: the data just list the worst cases			

➤ Out of Band edge for 5470-5725MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5470	-35.88	-27
Highest	Above 5725	-38.45	-27
Note: the data just list the worst cases			

- For the frequency band 5.250-5.350GHz, 5.470-5.725GHz, 802.11n HT20)
- Harmonics And Spurious Emissions

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5260MHz)							
10520	50.93	7.12	58.05	74	-15.95	H	PK
10520	34.39	7.12	41.51	54	-12.49	H	AV
10520	50.78	7.12	57.90	74	-16.10	H	PK
10520	35.24	7.12	42.36	54	-11.64	H	AV
High Channel (5320MHz)							
10640	52.06	7.24	59.30	74	-14.70	H	PK
10640	35.37	7.24	42.61	54	-11.39	H	AV
10640	51.93	7.24	59.17	74	-14.83	H	PK
10640	35.06	7.24	42.30	54	-11.70	H	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5500MHz)							
11000	50.92	7.57	58.49	74	-15.51	H	PK
11000	34.52	7.57	42.09	54	-11.91	H	AV
11000	50.87	7.57	58.44	74	-15.56	H	PK
11000	32.90	7.57	40.47	54	-13.53	H	AV
High Channel (5700MHz)							
11400	50.44	8.75	59.19	74	-14.81	H	PK
11400	33.62	8.75	42.37	54	-11.63	H	AV
11400	50.89	8.75	59.64	74	-14.36	H	PK
11400	33.90	8.75	42.65	54	-11.35	H	AV

➤ Out of Band edge for 5250-5350MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-35.12	-27
Highest	Above 5350	-36.25	-27
Note: the data just list the worst cases			

➤ Out of Band edge for 5470-5725MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5470	-36.12	-27
Highest	Above 5725	-39.41	-27
Note: the data just list the worst cases			

Note: this EUT was tested in the low, high channel and the worst case position data was reported.

- For the frequency band 5.250-5.350GHz, 5.470-5.725GHz, (802.11n HT40)
- Harmonics And Spurious Emissions

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5270MHz)							
10540	51.56	7.15	58.71	74	-15.29	H	PK
10540	34.07	7.15	41.22	54	-12.78	H	AV
10540	50.34	7.15	57.49	74	-16.51	H	PK
10540	33.32	7.15	40.47	54	-13.53	H	AV
High Channel (5310MHz)							
10620	52.68	7.22	59.90	74	-14.10	H	PK
10620	34.84	7.22	42.06	54	-11.94	H	AV
10620	50.65	7.22	57.87	74	-16.13	H	PK
10620	35.57	7.22	42.79	54	-11.21	H	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5510MHz)							
11020	51.80	7.63	59.43	74	-14.57	H	PK
11020	33.35	7.63	40.98	54	-13.02	H	AV
11020	52.06	7.63	59.69	74	-14.31	H	PK
11020	34.79	7.63	42.42	54	-11.58	H	AV
High Channel (5670MHz)							
11340	49.07	8.58	57.65	74	-16.35	H	PK
11340	34.72	8.58	43.30	54	-10.70	H	AV
11340	49.54	8.58	58.12	74	-15.88	H	PK
11340	34.84	8.58	43.42	54	-10.58	H	AV

➤ Out of Band edge for 5250-5350MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-35.77	-27
Highest	Above 5350	-36.24	-27
Note: the data just list the worst cases			

➤ Out of Band edge for 5470-5725MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5470	-36.99	-27
Highest	Above 5725	-39.89	-27
Note: the data just list the worst cases			

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

10. Frequency Stability

10.1 Standard Applicable

According to §15.407(g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

10.2 Test Procedure

According to §2.1055, the following test procedure was performed.

The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.

The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode.

10.3 Summary of Test Results/Plots

Antenna1:

U-NII-1: 5250-5350MHz worst case at 802.11a middle channel				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	24	-30	159	0.0301
100%		-20	174	0.0329
100%		-10	158	0.0298
100%		0	131	0.0247
100%		+10	182	0.0343
100%		+20	136	0.0257
100%		+30	129	0.0244
100%		+40	165	0.0312
100%		+50	124	0.0235
Low Battery power	20.4	+20	128	0.0242
High Battery power	27.6	+20	181	0.0343

Antenna1:

U-NII-1: 5470-5725MHz worst case at 802.11a middle channel				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	24	-30	160	0.0285
100%		-20	177	0.0316
100%		-10	158	0.0283
100%		0	126	0.0226
100%		+10	179	0.0321
100%		+20	136	0.0243
100%		+30	131	0.0235
100%		+40	164	0.0294
100%		+50	124	0.0222
Low Battery power	20.4	+20	133	0.0239
High Battery power	27.6	+20	134	0.0239

Antenna2:

U-NII-1: 5250-5350MHz worst case at 802.11a middle channel				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	24	-30	164	0.0310
100%		-20	171	0.0323
100%		-10	156	0.0296
100%		0	128	0.0242
100%		+10	174	0.0330
100%		+20	130	0.0245
100%		+30	132	0.0249
100%		+40	168	0.0317
100%		+50	127	0.0241
Low Battery power	20.4	+20	130	0.0247
High Battery power	27.6	+20	166	0.0314

Antenna2:

U-NII-1: 5470-5725MHz worst case at 802.11a middle channel				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	24	-30	156	0.0279
100%		-20	174	0.0311
100%		-10	164	0.0293
100%		0	126	0.0225
100%		+10	174	0.0311
100%		+20	133	0.0237
100%		+30	138	0.0246
100%		+40	160	0.0286
100%		+50	127	0.0227
Low Battery power	20.4	+20	160	0.0287
High Battery power	27.6	+20	123	0.0221

***** END OF REPORT *****